

THE RAILWAY GAZETTE
A Journal of Management, Engineering and Operation
INCORPORATING
Railway Engineer • TRANSPORT • The Railway News
The Railway Times • Herapath's Railway Journal • RAILWAY RECORD.
RAILWAYS • ESTABLISHED 1835 • THE RAILWAY OFFICIAL GAZETTE

PUBLISHED EVERY FRIDAY

AT

33, TOTHILL STREET, WESTMINSTER, LONDON, S.W.1

Telegraphic Address: "TRAZETTE PARL., LONDON"
Telephone No.: WHITEHALL 9233 (6 lines)Annual subscription payable in advance and postage free:
British Isles and Abroad.....£2 5s. 0d.
Single Copies.....One Shilling
Registered at the General Post Office, London, as a Newspaper

VOL. 65. No. 6

FRIDAY, AUGUST 7, 1936

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DIESEL RAILWAY TRACTION

A Supplement illustrating and describing developments in Diesel Railway Traction is presented with each copy of this week's issue.

Interim Dividends

THE publication of the G.W.R. statement for the first half of this year completes the announcements for the four main-line Home railways, and enables an impression to be formed of the whole picture. The L.M.S.R. results, received by us just in time for publication last week but too late for mention in our editorial note, provided the one bright feature of the half year, and the increase in net revenue of £440,000 has justified the resumption of full interim payments on all the preference stocks. The G.W.R. has again declared an interim dividend of $\frac{1}{4}$ per cent. on the consolidated ordinary stock after once more making an appropriation from free reserves, which, however, is described this time as temporary. Railway receipts of the L.M.S.R. increased by £1,200,000, and working expenditure by £700,000, so that railway working showed a net improvement of half a million pounds, and it was a reduction in miscellaneous net receipts which brought down the total net increase to £440,000. With the G.W.R. gross railway receipts were up £449,000 (£95,000 passenger; £347,000 goods; and £7,000 miscellaneous), but the company's docks revenue declined £55,000, expenditure increased by £359,000, and the increase in total net revenue from all sources was but £39,000.

Sleepers Praise Sleepers

Too often it is only the fault findings of the habitual grouse that are heard by both the public and the railway official. The man who is pleased with the service he receives usually shows his gratitude merely by availing himself further of it. The new L.M.S.R. sleeping cars illustrated in THE RAILWAY GAZETTE for June 24, however, seem to have made such a profound impression upon the travelling public as to invoke many enthusiastic expressions of praise from those using them, especially on the Anglo-Scottish routes during the recent holiday week-end. Even a member of the fastidious medical profession broke the traditional silence of the British railway journey to extol the comfort and good ventilation equipment of these luxurious vehicles. There was also at least one traveller who set out intending to travel third, but who changed his mind and exceeded to first class on seeing the tempting interior of one of the new coaches. Yet another passenger spoke with admiration of being able to manipulate without danger a "cut throat" razor while travelling at a speed of a mile-a-minute.

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The Week's Traffics

Once again the first part of the August holiday week-end—including the Sunday in all cases but the L.N.E.R., which closes its accounts on the Saturday—has shown gains over the preceding year. There is an increase in all classes of traffic of £239,000 over the thirty-first week of 1935, which included the same part of the holiday, and this is £106,000 more than the corresponding increase recorded last year. Of the total advance, £130,000 is accounted for by passenger traffic, as against £120,000 under this head in 1935. Coal traffics were substantial contributors to the £109,000 increase in freight.

	31st Week			Year to date		
	Pass., &c.	Goods, &c.	Coal, &c.	Total	Inc. or Dec.	%
L.M.S.R.	£ 59,000	£ 19,000	£ 25,000	£ 103,000	£ 1,392,000	3.90
L.N.E.R.	£ 39,000	£ 9,000	£ 33,000	£ 81,000	£ 815,000	3.14
G.W.R.	£ 20,000	£ 12,000	£ 6,000	£ 38,000	£ 324,000	2.18
S.R.	£ 12,000	£ 3,000	£ 2,000	£ 17,000	£ 132,000	1.10

The Irish railway receipts are up to July 31, and show a decrease of £800 on the Great Northern, and increases of £791 and £187 respectively on the G.S.R. and B. & C.D.

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The Mogyana Railway Report

At the annual general meeting of the Mogyana Railway Company held in São Paulo on May 27, the following principal results for the financial year ended December 31, 1935, were declared and compared with those for 1934:—

	1934	1935
	Contos	Contos
Gross receipts:		
Passenger	7,548	8,587
Parcels, &c.	2,978	3,057
Coffee	13,368	10,865
Other goods	17,086	18,721
Livestock	1,189	1,513
Miscellaneous	4,762	4,844
Total	46,931	47,587
Expenditure	34,085	36,616
Net receipts	12,846	10,971
	Per cent.	Per cent.
Operating ratio	72.6	76.9

Increased expenditure in 1935 was due mainly to the necessity of finding larger sums in local currency for payment of external debt interest, owing to depreciated exchange rates, and also to the exigencies of various social laws demanding higher rates of pay and shorter hours of service. To the net receipts of 10,971 contos must be added 2,994 contos, representing the carry forward from 1934

and adjustments on past interest payments, and, with 10,000 contos set aside for interest on external debt and 2,082 contos for miscellaneous charges, the balance of 1,883 contos was carried forward to 1936. It will be noted that passenger and parcel earnings together improved by 10 per cent., while goods and livestock receipts remained about the same as in 1934. This was due to the 20 per cent. fall in coffee receipts counteracting a 10 per cent. improvement of other goods and livestock, coffee being some 30 per cent. of the total freight carried.

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The New Bay Railway at Durban

Railway construction in South Africa began with the railway from Durban to the Point, which was officially opened to traffic with much ceremony on June 26, 1860. Recently this line was included in the Natal electrification scheme, and it was then decided to abandon the original alignment through the centre of the town—which included five level crossings—and to build a new track around the bay side on reclaimed land. Reclamation work began some four years ago under the control of Mr. D. E. Paterson, the Harbour Engineer, and, on the completion of this, electrification was started in November last. The old steam line was used for the last time on May 2, and on the following day the first official train hauled by an electric locomotive traversed the new line, which sweeps round the famous Durban Bay from Congella to the Point via the Esplanade. The length of the new line is only 1 mile 60 chains from Albert Park box, where it joins the Congella marshalling yard, to Cato Creek yard, but in conjunction with the essential electrification of the lines in Congella yard, which extends for $2\frac{1}{2}$ miles between Berea Road and Umbilo, some 20 track miles have been electrified. After almost 76 years of steam operation, the first railway in what is now the Union of South Africa has therefore not only changed its motive power but also abandoned its original track.

* * * *

Reducing Supply to Demand in U.S.A.

During the last eight years the Lehigh Valley Railroad has been engaged in killing four birds with one stone. With the falling off of traffic, many buildings, miscellaneous structures, and even sections of the track work have been rendered redundant. Instead of abandoning these works in a derelict condition, the railway administration has indulged in a systematic clean-up which has served to cut losses, promote economy, increase efficiency, and improve the appearance of the property. Under the scheme no fewer than 700 structures and 220 miles of track have been removed. This drastic programme has resulted in the railway realising \$570,000 in salvage and an annual saving of approximately \$147,000 in taxes and maintenance costs. In one case nearly 50,000 ft. of trackwork was removed at a cost of only \$2,269. Against this the salvage value of the materials amounted to \$58,144, and a yearly saving in taxes and maintenance costs of \$5,000 was effected. In carrying out the scheme care has been taken to avoid depreciating possible future developments and the probability of an increase in traffic.

* * * *

Gauge Conversion in Manchukuo

On the last day of August, 1935, the important section of the North Manchuria Railway (formerly Chinese Eastern Railway) between Hsingking and Harbin was converted in a few hours from the Russian gauge of 5 ft. to the standard 4 ft. 8½ in. prevailing elsewhere in Man-

chukuo. This left on the 5-ft. gauge the long stretch between Manchouli and Pogradichinaya which was built originally as part of the Trans-Siberian main line through to Vladivostok. Now the long section of this between Harbin and Manchouli has been changed to standard gauge, and a press message from Tokyo says that the whole length of nearly 600 miles was converted in four days without any interference with normal traffic. Practically all the old Chinese Eastern Railway has therefore now become mainly a domestic line, for, apart from any political question, it is not now possible to run through trains from Europe to the coast of the Sea of Japan via the original Trans-Siberian route. On the other hand, this gives added significance to the U.S.S.R. railway along the Amur valley which reaches Vladivostok by a longer route, but entirely on Soviet soil and throughout on the 5-ft. gauge.

* * * *

Operating Signals by Spring Power

The use of energy stored in springs or weights to operate points and signals has been suggested from time to time, and apparatus of the kind has been installed in a few places. The energy is sometimes stored by hand winding, and sometimes by means of a treadle depressed by the treads of passing wheels. The Chinese Eastern Railway fitted several stations with long-distance point operation on this principle, and there is one example of it here. An interesting application of spring power has lately been made by the Reichsbahn, to operate the distant signal placed near the home which repeats the starter, now more and more common, and long used in South Germany. The arrangement is such that when the home signal is cleared after the starter, this distant comes "off" with it, but if the starter is "on," the necessary energy is stored in a spring until clearance of the starter releases an electric lock and allows the spring to pull the distant "off." An electric slot, or reverser, connected above the lock mechanism, ensures the distant going to the warning position if the starter is put to danger while the home is still "off." This arrangement enables a wire transmission to be saved, often important in the long stations with two cabins frequently met with, and at times elsewhere.

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The Preston Tragedy

We summarise on page 235 Mr. J. L. M. Moore's report on the fatal accident near Lea Road, Preston, on March 11, when 4 permanent way men were killed and one injured by a fast running train, the immediate approach of which was hidden by smoke and steam emitted from a train on an adjacent line. Mr. Moore places the primary responsibility on the lookout man, who failed to call the men off the line when no longer able to protect them, and thinks he lacked the quickness of mind to grasp the position. The driver of the train failed both to observe the speed restriction imposed and to whistle, although knowing that work was in hand there. Mr. Moore refers to the similar accident at Watford on November 9, 1932, inquired into by the late Mr. J. P. Scott Main, and dwells on the necessity of improved means of selecting and registering lookouts, as well as the possibility of introducing more powerful warning signals or having extra lookout men to ensure that everyone hears the warning in ample time. The German State Railway, as we recorded in our issue of July 7, 1933, has been making use of the Tyfon whistles used on ships, and operated from compressed carbonic acid gas cylinders, which make a highly distinctive sound that can be heard above a good deal of noise and at a considerable distance. Tests convinced Mr. Moore that the existing whistles were more effective than horns.

"Waste Not, Want Not"

When, in 1859, John Ramsbottom, then Locomotive Superintendent of the London & North Western Railway, devised track water troughs, the engines were fewer in number, the tenders smaller, and water was at least as plentiful as now, whilst in all probability costing less. An official statement recently issued by the L.M.S.R. states the company now uses 9,600 million gallons of water a year for its 7,700 locomotives, costing no less than £300,000. The enginemasters have had it pointed out to them that if, when filling locomotive tanks at depôts, they were each to save five gallons of water a day, the company would save £2,750 annually. That being so, how much more could be saved if wastage at the troughs were prevented? We have heard it remarked that at troughs engines "spill more than they use," and in order to prevent this as far as possible, the fitting illustrated and described in our issue of October 27, 1933, page 610, when in the experimental stage, is being fitted on all new engines and numerous others to the front of the scoop; thus, by directing the water from the sides of the trough towards the centre, an artificial increase in the height of the water in the region of the scoop mouthpiece is caused, and so increases by 200 gallons the amount it is possible to pick up at each lift. The use of this device is stated to result in a reduction by about 50 per cent. of the water wasted at the troughs. The daily saving is estimated at 3½ million gallons.

* * * *

The Father of the Paris Metro

The regretted death on Tuesday of M. Fulgence Bienvenue removes an outstanding personality, for he was justly known as the "father of the Paris Metro." M. Bienvenue who was born 85 years ago received his technical education at the Ecole Polytechnique and entered the service of the city of Paris as an engineer at an early age. He interested himself keenly in the traffic arrangements of the French capital and it was due largely to his efforts that the Paris Metro was eventually undertaken. For forty years previously the subject had been considered, and scheme after scheme rejected mainly on military and political grounds; the story was briefly outlined in our issue of November 3, 1933. The task which M. Bienvenue took up in 1896 was therefore a thankless one, but he made full use of the forthcoming Paris Exhibition of 1900 to justify his scheme, which was approved by the Municipal Council in July, 1897. With some modifications a law of March 30, 1898, ratified the proposals, and work was begun towards the end of that year. The first section of the Metro—Porte Maillot to Porte de Vincennes—was opened on July 19, 1900. From that time the Paris Metro has grown steadily and M. Bienvenue's work has been recognised by such honours as the Paris gold medal and the Grand Cross of the Legion of Honour. On July 1, 1933, the former Maine station on the Metro was re-named Bienvenue, and thus the city he served so well perpetuates his memory on the underground railway system of his creation.

* * * *

Rail Welding Catechism

After Mr. H. S. Clarke, Engineer, Maintenance of Way, Delaware and Hudson Railroad, had read his paper before the Maintenance of Way Club of Chicago on "The Welding of Rails in Long Continuous Sections," which we quoted in our article on this subject in THE RAILWAY GAZETTE of March 6 last, he explained in answer to questions that there had been some rail breakages in the earlier experiments, the breaks occurring adjacent to the welds and

seemingly to be the result of the annealing. Precautions were therefore taken with such good effect that fractures of this kind were eliminated. The cost of the Thermit pressure welding at first, before experience had been gained, was fairly high, but Mr. Clarke estimated that now it should be possible to put in such welds in quantity for about \$8 a joint. The exact cost, however, depends on the men and how and when they do the work. In reply to a question as to the re-use of the long continuous welded rail when it had become too much worn for main line service, Mr. Clarke pointed out that the principal reason for removing rail from main line track was battered joints and not wear on the surface of the rest of the rail. The elimination of the joints should therefore give a much longer life to the rail in the track. In any case Mr. Clarke considered it would be quite practicable to take up the long lengths and relay them, although, of course, it might be necessary to cut them here and there according to stresses.

* * * *

American Bridge Impact Investigations

An article on "Impact in Bridges—An Achievement in Research" is included in the June 6 issue of our American contemporary the *Railway Age*. It is a short account of the work which led up to the formation of the new rules adopted by the American Railway Engineering Association. The report of our own Bridge Stress Committee had been studied carefully, but the recommendations were not directly applicable in the U.S.A. because of the marked differences between English and American rolling stock and bridges. Investigations were therefore carried out on similar lines, and the new rules established. It is rather surprising, however, to see the American impact formulae for certain ranges of span quoted in terms of deflection due to hammer blow, and that due to the static live load. Practically, of course, the ratio of these two is the same as the ratio of the weights concerned, and this would seem to be the obvious form for the equations. If a bridge is to be designed, no deflections are previously known; but if it is an old one whose carrying capacity is to be checked, carefully controlled tests can give more valuable information than any formula, although the time involved would be greater.

* * * *

Speed, Power and Cost

The statement incorporated in the publicity matter of one of the leading locomotive building firms in America, to the effect that "the increased drawbar horsepower and improved design of modern locomotives move heavier trains at higher speeds and at greatly reduced costs per 1,000 revenue ton-miles" was ably supported by the figures given by Mr. L. W. Wallace, Director of Equipment Research, Association of American Railroads, in a paper he read before the Pittsburgh Railway Club. In 1910, he stated, the average running speed of freight locomotives was 20 m.p.h.; that of 1920, 33 m.p.h.; and that of 1930, 42 m.p.h. The drawbar h.p. of the 1910 engine was 1,240, but by 1920 this had increased to 2,000, and by 1930 to 3,600, a three-fold advance; whilst there are locomotives in service today with 4,000 to 5,000 drawbar h.p. These figures are illuminating in themselves, and when reviewed in relation to the cost of operating the heavier units they appear all the more satisfactory. The average cost per 1,000 revenue ton-miles of freight traffic on United States railways has been reduced from \$10.66 (£2 2s. 6d.) in 1920 to \$6.48 (£1 5s. 10d.) in 1933, justifying most conclusively the claim that modern locomotives are essential for economical railway operation.

The Railway Wages Decision

THE first decision (No. 1, dated July 27) of the new Railway Staff National Tribunal was published last week-end and is recorded in detail on pages 220-222 of this issue. The tribunal, which was composed of two members (Mr. A. L. Ayre and Mr. J. W. Bowen) in no way connected with the railway industry, together with Sir Arthur Salter, who was appointed as independent Chairman by the Minister of Labour, was asked by the National Union of Railwaymen, the Railway Clerks' Association, and the four main-line railway companies to hear and decide claims which had been the subject of abortive negotiations between the parties. The claims under consideration by the tribunal were that the residue of the reductions made by the National Wages Board in March, 1931, should be terminated. The National Wages Board decided in 1931 upon reductions in the rate for overtime, night duty, and Sunday duty performed by conciliation grades, together with a 2½ per cent. deduction from earnings over 40s. a week. The "further" deduction had ceased to operate since the beginning of last year, under an agreement made in August, 1934. The tribunal sat in public on July 15, 16, 17, and 20, and has been commendably prompt in announcing its decision, which halves the existing percentage deduction from all earnings and increases to time-and-a-quarter the rate of payment for overtime worked by conciliation grades. These changes are to take effect in the middle of August and continue for a year at least.

Prefaced to the decision is a carefully reasoned report. It is stated that the claims were referred to the tribunal "to reject, to grant, or to grant in part." As the tribunal conceived its duty, it had "to consider any decision as affecting the distribution of what is known as the 'net product of the industry' between those working in it on the one hand and (through the companies) the investors on the other." The tribunal then having examined all the evidence presented by the parties reviewed the changes since 1931. "Two facts" it says "stand out clearly from this brief review. The first is that the actual results before us as we met still showed a decline on those before the National Wages Board in March, 1931, and indeed upon any estimate they could reasonably have made for the year ahead of them. The second is that, whereas the general movement in 1931 was steeply downward, it has since 1933 been definitely, though more gradually, upward. We are concerned with the past, not in itself, but as an indication of the future; it is the reasonable prospects for the period in which any award would be operative that we must consider. As regards prospects, there are some favourable factors which should be taken into account. In the first place, if the general upward movement is continued, it should give better results for the year from the summer of 1936 to that of 1937 than for the last twelve months. In the second place, the prospect of rating relief is an important factor." We have quoted this passage in full, for it seems to us to give a clear indication of the prime considerations which led the tribunal to its conclusions. Put briefly, the tribunal expects railway revenues to improve, and, in conceding part of the claims of the unions, the tribunal holds the view that, because of brighter prospects, the companies will find themselves able to afford the cost involved. How far this view can be justified time will show, but it should be noted that, if the decision is adopted, its effect will be to increase the labour cost of the railway industry by over a million pounds per annum. Thus the companies are required to increase the pay of their employees at once and to recover the cost from the Bank of Futurity.

One of the main arguments adduced by the companies'

advocate at the recent hearing was that the companies found the burden of their labour costs excessive. Indeed, it was contended that any further increase "may tend to reduce the competitive power of the companies to win and retain traffic." The vast sums expended by the four main-line railway companies on salaries and wages are not generally known. This bill totalled no less than £97,000,000 for 1935 and, for the present year, the cost is likely to be considerably higher by reason of the tribunal's decision, and also because an increased number of staff is now employed. The tribunal stated that it was "impressed by the fact that deductions intended to be temporary—though no term was fixed—from earnings based on standard rates have now been in operation for over five years" and "feels that, other things being equal, the case for returning to the standard rates becomes stronger with time." This argument may sound convincing, but has it really any valid weight? As we see it, so long as the continuance of the 1931 wage cuts can be justified on financial grounds the time factor can, in logic, have no bearing on the issue. A more impressive argument used by the tribunal is that "some account must be taken of the effects of staff economies in inflicting losses of one kind or another on the staff to a greater extent than can have been reasonably anticipated in March, 1931." In this connection we are glad to note that the tribunal pays a well-merited tribute to the companies for their "elaborate arrangements . . . in close co-operation with the unions to ensure that reductions in personnel should be so arranged as to cause the least possible hardship and injustice to those in the service." One satisfactory feature of the decision is that it was unanimous. It is also not without significance that Mr. Bowen, the independent member nominated by the trade unions, should have found himself able to join with his other two fellow members, in deciding against the claims of the National Union of Railwaymen for increased rates of payment for night duty and Sunday duty performed by conciliation grades. It now remains to be seen whether the companies and the trade unions agree to adopt the compromise settlement which the tribunal has recommended after its painstaking and admirably conducted investigation of a complex problem.

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Spanish Railways During the Civil War

WITH the suspension of all ordinary communication, not only between Madrid and the outer world but also between the different provinces, it has been very difficult to obtain information as to the state of railway communications in Spain, and the extent to which the various lines have suffered or have been able to continue working during the civil war that is raging there. As far as can be ascertained the railways ceased normal working on Saturday, July 19, when the first news of the revolt was immediately met by the declaration of a general strike of the workers, including railway employees, in many districts. By Sunday, July 20, when the conflict had extended to the whole of the country, railway transport had, apparently, ceased altogether on the main lines, and this general stoppage seems to have continued until the 24th, when the service on the Sarriá electric railway, running between Barcelona and the suburbs, restarted on a limited scale. As there was still no main line service, however, transport of mail by lorry to the frontier from Barcelona was being organised by the 25th. On that date also food supplies were being despatched to Madrid by road lorries from Valencia.

What does seem fairly certain is that, first in Catalonia and later in Madrid, all public services were taken over by

SYM
(1)

API
(1)

GOT
(9)

LÖTS
(9)

MON
(8)

ARLE
(6)

TAUE
(5)

committees of workers, appointed by the unions, the managers and boards of directors of the principal railways having been "dismissed." In Barcelona, the trams, underground vehicles, and buses bear the initials C.N.T. and F.A.I. of the workers' unions, and in Madrid the control is mainly in the hands of the U.G.T. Two trains left Barcelona for the frontier on July 27, the first since the beginning of the outbreak, and transport service generally in Catalonia seems now to have become practically normal. In Madrid the railway communications are as yet limited to the southern lines to Valencia and Alicante, and preference is being given on these lines to the transport of food stuffs for the capital. The British-owned Great Southern of Spain Railway is running a limited service under the company's own officials, but the line was cut near Baza and so far the administration has not been allowed to repair it; direct communication between Granada in the west and Alicante in the east is, therefore, still interrupted. In the north, it is reported that rail communication was re-established between San Sebastian and Bilbao on July 29, but in this area the position would seem to vary from day to day.

Long Railway Tunnels

UNTIL a comparatively few years ago, very long railway tunnels were an exclusive feature of Alpine regions, and any tunnel elsewhere that approaches those

through the Alps in character and length is worthy of more than passing attention. We therefore make no apology for reverting to the subject of the great Apennine tunnel on the Florence-Bologna *direttissima*, which not only exceeds in length all but one of the famous tunnels through the Alps, but also possesses the dignity of being the longest double-line tunnel in the world. On another page we publish an article, supplementary to those that have already appeared in our columns, which rounds off the information available regarding the Apennine tunnel. In order that this great engineering achievement of Fascist Italy may be considered in true perspective we have prepared the subjoined table setting out principal details of the Apennine and half-a-dozen famous Alpine tunnels.

Although at the present time it ranks but fifth in order of length, the Mont Cenis was the pioneer of very long railway tunnels, and its site was actually selected as early as 1840 as the most suitable for a railway tunnel to afford communication between France and Italy. The proposal was not seriously entertained until 1852, and four years later the Government of the Kingdom of Sardinia undertook the work. When it is recalled that hand-drilling the holes for the blasting charges was the only method then available, the tremendous nature of the task is better appreciated. While work was still in progress the Kingdom of Italy was formed and Savoy was ceded to France, so that, when finished, the Mont Cenis tunnel joined two great countries. Experience gained in the prosecution of

Tunnel and length	Location	Railway	Territory	Track	Dates of boring		Approx. cost per lin. yd.	Notes
					Start	Finish		
SIMPLON ... (12 mls, 569 yd.)	Brigue (Switzerland) to Iselle (Italy)	Swiss Federal and Italian State (worked entirely by Swiss Federal Railways)	Switzerland and Italy	Two single-track horseshoe tunnels, 16 ft. 5 in. wide × 19 ft. 6 in. high	Aug., 1898	Feb. 24, 1905	£ 148 (first tunnel)	Opened May 30, 1906; passing station half-way through; second tunnel begun December, 1912, delayed by the war, and completed December 4, 1921; 3-phase electric traction from opening in 1906; standard Swiss single-phase 1930.
APENNINE ... (11 mls, 879 yd.)	Vernio to Castiglione de Pepoli on the Florence-Bologna <i>direttissima</i>	Italian State	Italy	Double track tunnel	Jan., 1920	Dec., 1929	—	Longest double-line tunnel in the world; passing station half-way through; formally opened April 22, 1934, electric traction.
GOTTHARD ... (9 mls, 547 yd.)	Göschenen to Airolo	Swiss Federal	Switzerland	Double track horseshoe tunnel; 26 ft. 3 in. wide × 24 ft. 7 in. high	June 4, 1872	Oct., 1880	143	Workmen met in middle February 29, 1880; first locomotive ran through, December 24, 1881; opened May 27, 1882; Gotthard Railway Company taken over by State, May 1, 1909; electric traction introduced September 14, 1920.
LÖTSCHBERG ... (9 mls, 132 yd.)	Kandersteg - Goppenstein on the Spiez-Brigue line	Bern-Lötschberg-Simplon (Bernese Alps Railway)	Switzerland	Double-track tunnel	Oct. 1, 1906	March 31, 1911	—	Masonry completed April 22, 1912; opened July 15, 1913; electric traction from opening; only day traffic until September 18, 1913.
MONT CENIS ... (8 mls, 868 yd.)	Modane (France) to Bardonecchia (Italy)	Italian State	France and Italy	Double track horseshoe tunnel; 26 ft. 3 in. wide × 24 ft. 7 in. high	Aug., 1857	Dec. 25, 1870	226	Machine drilling introduced 1861; tunnel opened September 17, 1871; electric traction 1920.
ARLBERG ... (6 mls, 639 yd.)	St. Anton to Längen on the Innsbruck-Bludenz line	Austrian Federal	Austria	Double track tunnel 25 ft. 3 in. wide	May, 1880	Nov. 19, 1883	108	Opened September 20, 1884; electric traction introduced April 29, 1925.
TAUERN ... (5 mls, 555 yd.)	Böckstein (near Badgastein) to Mallnitz	Austrian Federal	Austria	Double track tunnel	July 6, 1901	July 21, 1907	—	Bottom drifts met July 21, 1907; tunnel opened, July 5, 1909; electric traction introduced December 15, 1933.

this work, and the introduction of machine drilling, made the way very much easier for future enterprises.

In preparing our table we have experienced considerable difficulty owing to the lack of agreement between various official and semi-official sources of information. In one case—that of the Mont Cenis—this may be explained chiefly by the fact that the tunnel was lengthened on the French side in 1881 because of land movements, and at the Italian end a slight change of course accounts for a further small difference. Thus the original length of approximately 12,820 metres (7 miles 1,700 yd.) has been increased to the present figure of about 13,668 metres (8 miles 868 yd.). Then, in regard to the Simplon, the old and new tunnels are some 20 metres different in length, the newer tunnel being the longer. Apart from such accountable differences, the fact remains that some disagreements in official returns are not understandable.

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Railway Progress in Indo-China

THE great longitudinal trunk line from Hanoi to Saigon, which is almost completed, forms the last work of any magnitude scheduled for the extension of the Indo-China Government Railways. It forms the subject of a letter in our Overseas columns on page 219. Traversing Annam, and built at a cost of over 53,000,000 piastres, this line unifies the north (Tongking) and south (Cochin China) railway systems which hitherto have been isolated, but which will now be operated as one system with headquarters at Hanoi. The Government lines, including the Tuyhoa to Nha-trang section now being completed, total 1,298 miles, and with the exception of the 50-mile Dalat branch worked on the rack and adhesion principle, and the 12-mile spur from Tanap to Xomcuc, they form one through north to south line from Na Cham, on the Chinese frontier, to Mytho, at the mouth of the Mekong. The first line, from Saigon to Mytho, 43 miles long, was finished in 1885, but further construction has proceeded in three stages: first, from 1902 to 1913, when 598 route miles were opened; second, 1926-27, when 186 miles were opened; and third, 1934-36, when 471 miles more were completed. A difficult financial position has caused the shelving *sine die* of certain important projects, such as the trans-Indo China line from Tanap to Thakek, and what money is available is being devoted now to the opening up of Laos and Cambodia by means of roads, and a great trunk road system is being built from Saigon to Pakse, Thakek, and Wiengchan; the last named town eventually will be linked up by road with Hanoi also. Apart from the cost of the trunk railway, about 8,000,000 piastres have been spent during the last six years in improving existing lines, purchasing Michelin railcars and steam locomotives, and building a big new station and yard at Saigon-Cholon. Traffic decreases were scarcely felt by the Indo-China Government Railways until 1932, when the revenue dropped by 23 per cent. In 1933 there was a further drop of 7.5 per cent. to 3,722,700 piastres, the operating expenditure being reduced by a total of 26.5 per cent. to 3,799,400 piastres.

On the other hand, the principal private railway, the Yunnan line, has suffered only to a slight extent, the drop in receipts averaging only 2 per cent. per annum between 1931 and 1934, and the operating ratio decreasing from 93 to 86 per cent. Since its completion in 1910 this railway, which traverses most difficult mountainous country, has not increased its length, which is 539 miles. Diesel railcars have been introduced recently and enable the full distance from Haiphong to Yunnanjou to be made in a day, compared with two days required by steam trains. Two other private lines exist in Indo-China. The

first is the Phnompenh-Mongkolborey line, 208 miles long, which was built in 1931-33 at a cost of 20,000,000 piastres, and the annual revenue of which averages 328,250 piastres. It was intended to extend it to Aranya Pradhessa on the Siamese frontier, but the great falling off in tourist traffic, for which the extension was solely intended, has caused the construction to be deferred. The second private line is concerned mainly with the traffic to and from the rubber plantations. It runs from Ben-Dong-Xo to Loc Ninh, and at the former place has a non-physical connection with Saigon through the tramway system of the Cie. Française de Tramways. The receipts average only about 14,000 piastres a year.

Railway development in the south of Cochin China, and particularly the connection between Phnompenh and Saigon has been delayed by the extreme difficulty of bridging at a reasonable cost the numerous channels through which the River Mekong finds its way to the sea. To connect Phnompenh with the Government lines at either Saigon or Mytho would entail a bridge 3,500 ft. long, and with very deep foundations, over the Mekong. Recent agreements made between the Government and the two private lines in the south provide for the coördination of the rail, road, and river services of the two parties, with an estimated annual saving of 127,000 piastres, and a further agreement between the State and the Yunnan company provides for coöperation in the north. Road competition, particularly severe between Haiphong and Hanoi, has been met by reduced day return fares, reduced fares and increased free luggage allowance at holiday times, general reduction in the ordinary rates for short-distance travel, and by the introduction of railcars running to accelerated schedules. To combat the loss in freight traffic to the roads, the minimum weight for less-than-wagon load consignments has been reduced, and an all-in door-to-door tariff introduced for the lighter class of freight.

LETTERS TO THE EDITOR

(The Editor is not responsible for the opinions of correspondents)

Boiler Pressures in British Colonies

India, July 9

TO THE EDITOR OF THE RAILWAY GAZETTE

SIR,—In THE RAILWAY GAZETTE of April 24, 1936, a reference was made in the correspondence on page 786 to boiler pressures on locomotives in British Colonies. I note that your attention has been called to an earlier publication, and you may remember that the Bengal-Nagpur Railway "M" class engine of 250 lb. pressure, ordered from the North British Locomotive Co. Ltd. in August, 1928, was put on the road in October, 1929.

Yours truly,

"B.-N.R."

Double-Deck Railway Carriages

London, August 4

TO THE EDITOR OF THE RAILWAY GAZETTE

SIR,—I was greatly interested in the article on double-deck carriages on page 178 of your July 31 issue, but doubt the accuracy of your statement that double-decked sleeping cars have been used on the Swiss Federal Railways. These were designed but were they ever built? On the other hand the German State Railway certainly possessed some double-deck composite first and second class sleepers, for I travelled very comfortably in one less than ten years ago. It would be interesting to know if these vehicles are still running.

In your article you do not mention the Indian and the Danish examples of ordinary double-deckers, although you have referred to these on a previous occasion.

DEUX-ETAGES

PUBLICATIONS RECEIVED

Compulsory Acquisition of Land.

By R. A. Gordon. Second Edition. London: Stevens & Sons Ltd., 119-120, Chancery Lane, W.C.2. 8½ in. × 5½ in. × 1¼ in. 367 pp. Price 12s. 6d. net.—This, the second edition of a work first published in 1929, brings up to date the law on the subjects of compulsory acquisition of land and compensation, in view of the numerous statutes passed since that year dealing with housing, town and country planning, and the execution of public works. Railway companies are intimately concerned with these matters, which are necessarily complicated, and this book should prove a convenient guide to the principles and practice on the subject. The arrangement adopted in the first edition has not been changed materially, but several chapters have been re-written and additional material has been supplied. Reference is made to certain private Acts of 1934, including London Passenger Transport, Southern, and London Midland & Scottish, and many new cases have been added. From the railway point of view the chief interest attaches to the information given on the Lands Clauses Consolidation Act, 1845, and the Railways Clauses Act, 1845, and the important variations from the last-mentioned Act made by the Mines (Working Facilities and Support) Act, 1923, in the law relating to minerals under railways. The latest leading case under the 1923 Act, that of L.N.E.R. Company v. Hardwick Colliery Company (1935), receives due attention. We miss, however, any reference to the alterations in the law regarding the disposal of superfluous lands which have been made in recent private Acts of the railways. There is a well-selected table of cases, and an adequate index.

Universal Directory of Railway Officials and Railway Year Book, 1936-1937. London: The Directory Publishing Co. Ltd., 33, Tothill Street, S.W.1. 8½ in. × 5½ in. × 1¼ in. 586 pp. Cloth covers. Price 20s. net.—The 42nd annual edition of this standard work—probably the most complete railway reference book ever compiled—has just been published. By fixing the date of issue in the middle of the year, it has been found possible to include most of the operating and other figures for the year 1935, and thus give the volume the maximum currency with the latest annual information. The present volume, which is the fourth since amalgamation with *The Railway Year Book*, continues to incorporate the most useful features of both publications, as well as much other information. In the new edition opportunity has been taken to include a chronological list of outstanding events in railway history; the pages of British railway facts and figures contain up-to-date additional matter, and care has been taken to present in the statistical section the latest available figures.

Many important overseas changes in organisation during the year have been noted, for example, the nationalisation of the Turkish railways, and these are suitably covered in the new edition. The increasing development in the electrification of main-line steam railways has again necessitated revision of the tabulated information on this subject, and the table of the world's total railway mileage has been completely overhauled and amended from official replies to a questionnaire.

The general arrangement of the book is on a geographical basis, and the order in which entries appear has been selected so as to group all the railways in the United Kingdom, the British Colonial Empire and the Dominions in sequence, followed by the railways of foreign countries in which important British interests are held, and lastly, the railways of other foreign countries. This year there are three indexes, namely, (1) an index to countries; (2) a general index, including all references to railways and statistical and other information; and (3) a personal index of railway officials. Once again the practice has been followed of printing the text portion on paper that can be written on in ink, so that readers who wish to do so can make memoranda or note staff changes as recorded week by week in *THE RAILWAY GAZETTE* between now and the next edition.

Guide to Economical Transport.

London: Great Western Railway, Paddington. 8½ in. × 5½ in. 142 pp. Illustrated. Folding map. Stiff paper covers. Gratis.—This is a most informative little book, just published by the G.W.R., which sets out in a simple and concise form the extent and variety of freight facilities the company has to offer. Cash on delivery arrangements; containers; farm, factory, and household removals; insurance of live stock by rail; factory sites; railhead distribution; the time goods take in transit; and how to "register" goods speedily through to destination; are all dealt with in an orderly, well-indexed and handy manner. The index has the further merit of showing against every item the appropriate telephone extension number at Paddington: thus for "advertising on G.W.R. wagons" one calls extension 2428, and gets through without delay and without disturbing extension 2423, which is concerned with "private sidings."

It may come as a revelation to some of the present and potential G.W.R. customers to learn of the existence of the B.B.C. Express, the Spud, the General, and the Farmer's Boy. These are but a few of the many freight expresses run daily by the G.W.R. linking up all parts of the system, and giving "next day" delivery for goods. A list of these trains, the points between which they run, and the names by which they are known among the staff,

is one of the features of this handbook which imparts interest to relieve the bald presentation of freight facilities. The book, which should appeal to the expert engaged in industrial traffic management, to the trader, both large and small, and to the man in the street, may be obtained free from any G.W.R. office or direct from the Chief Goods Manager's Office, Development Department, Paddington station, London, W.2.

The Properties of Home-Grown Oak.

—This is the title of a new report in the series of Forest Products Research Records, of which it is number eleven (Timber Series No. 3). It is prepared by the Department of Scientific and Industrial Research, and is published by His Majesty's Stationery Office, price sixpence. After a general consideration of structure, seasoning, and mechanical properties, the report sets out in tabular form the results of tests on specimens from four consignments of British home-grown oak; it concludes with notes on preventive treatment against the attacks of insects.

Heat-Resisting Steels.—An important and successful line of research during recent years in the manufacture of steel has been the production of high-tensile steels in which the ratio of the elastic limit to the ultimate strength of the steel has been considerably increased. The advantages of steel of this description are that the weight of steel required for any given purpose, such as motion parts in a locomotive or girders in a bridge, can be reduced without loss of strength, and considerable economies in construction, of large structures in particular, are thus rendered possible. Among steels in this category is the Ducol high tensile steel manufactured by Colvilles Limited, 195, West George Street, Glasgow, who have recently published a booklet dealing comprehensively with the properties and applications of this material. An independent investigation by the Building Research Station of the Department of Scientific and Industrial Research on the properties of Ducol rolled steel joists shows an advantage, as compared with mild steel, of 1.38 to 1 in the yield stress of the flanges, 1.46 to 1 in that of the entire beam, 1.40 to 1 in the ultimate strength of the flanges, and 1.50 to 1 in the bending yield stress of the beams, in favour of Ducol, which has a guaranteed tensile strength of 37 to 43 tons per sq. in., and can be expected to give elongations on 8-in. test lengths of well over the 18 per cent. minimum specified in B.S.S. No. 548—1934, frequently to as much as 23 or 24 per cent. The Brinell hardness number is 165-200 as compared with 115-150 in the case of ordinary mild steel. Resistance to fatigue is also higher, and Ducol also has admirable welding properties. Among railway applications are main frames for locomotives (the turbine-driven L.M.S.R. Pacific No. 6202 is an engine so equipped) and boiler plates, coach and wagon underframes, and structures of all descriptions.

THE SCRAP HEAP

Caterpillars counted a victory over a train on Tuesday night. The crawlers crept on to the tracks of the Canadian National Railways, clustered themselves in thick masses, and stopped a mixed train *en route* to Mackie when two miles west of Nalalu. Other trains made only half their speed because of the slippery condition of the tracks. But the railway officials think they have found a solution. They are equipping an engine with a steam jet blower which will emit steam at a pressure of 200 lb. per sq. in. Then the engine will be sent on the job of blowing the caterpillars off the track.—From "The Albertan."

A large sum of money, amounting to about 12,500 yen was mislaid on a passenger train on the Mukden-Antung line by a Korean broker. As he once had his purse stolen on a train, he stealthily hid his money behind the lavatory as soon as the train started. Then he drank too much whiskey in the dining car and feeling comfortably inebriated he left all his money behind him and detained at Mukden. Hesitating to inform the police, he managed to learn that the carriage had gone to Shakako shops, near Dairen, whither he repaired, and was delighted to find his 12,500 yen intact.

A RAILWAY PROBLEM

Can anyone elucidate (asks a correspondent) a rather curious journey, as it seems to me, undertaken by the chief character in Mr. Aldous Huxley's latest novel "Eyeless in Gaza"? Anthony Beavis is travelling north to meet his friend Brian Foxe in the Lakes. Then we read (p. 458) of his "realisation that the train was crossing Shap Fell, and that in less than an hour he would be talking to Brian on the platform at Ambleside." Does one travel via Shap Fell to reach Ambleside? Is there a railway platform at Ambleside? Have I missed some obvious solution, or has Mr. Huxley, who has often blamed inaccuracy of others, been guilty of inaccuracy himself?—From the "Manchester Guardian."

According to a writer in *The New Zealand Railways Magazine*, many station names on the Canterbury-Otago, Otago Central, and Dunedin-Invercargill lines are mis-spellings of the original Maori. Some of them are based on local legends or customs as for instance Kurow (properly Kohurau), meaning "many mists." The story goes that the name is derived from the resource of a retreating warrior chief, who by his magical prayers conjured up a thick fog to conceal himself from his enemies. He might have achieved the same effect

in Manchester without invoking the assistance of his tribal gods. The English genius, however, stops short of naming a town "Many Mists," and were the legend to be adapted for home consumption it is doubtful whether an unsuccessful cotton broker (if such things exist) would be a sufficiently picturesque substitute for the Maori chief.

We like Omakau—"the place of the spouse"—which has a comfortable, domestic ring, and was doubtless first coined by an aboriginal suburbanite. Mihiwaka is a more complicated compound, the first two syllables meaning "a poetic greeting, chant of salutation, affection, or sorrow." Waka is Maori for canoe, so that the two together evidently have something in common with "Any more for the Skylark!" the ritual cry of native tribes around our British coasts.

RAILWAY NAMES OF GERMAN INNS

Probably in no other European country are inns, public houses, and places of refreshment so much associated with railway stations as in Germany, nor is so much care taken that a traveller can get not only drinks but good food too at all hours. During the 19th century, as railways developed in that country, the refreshment business expanded proportionally, so that now at even the smallest of places there is generally to be found some kind of *Wirtschaft* associated with the railway station. The station restaurants too are almost always excellent. Herr Bohlig, in the *Zeitung des Vereins*, mentions a number of names of public houses and restaurants derived from the railway; among them are the following:—

"Railway Exchange," "Railway Cellar," "Little Railway Garden," "Railway Casino," "State Railway," "Local Railway," "Light Railway," "Secondary Railway," "Express Railway," "Border Railway," "Narrow Gauge Railway," "Mountain Railway," "Rack Railway," "State Railway Station," "Shunting Yard," "Goods Station," "Goods Shed," "Goods Siding," "The Station Jug," "Little Station," "Block Station," "Halt," "End Station," "Light Railway Halt," "The Waiting Room," "The Viaduct," "The Tunnel," "The Long Tunnel," "The Railway Bridge," "Railway Curve," "The Old Pair of Points," "The Level Crossing Barrier," "Stop Signal," "Turntable," "Locomotive," "Corridor Train," "Express Train," "The Restaurant Car," "The Winged Wheel," "The Flying Wheel," "Head Guard" and "Assistant Guard."

Some of these names occur quite frequently, and there are, for instance, some 30 "Shunting Yard" restaurants and "Locomotive" is very common, so is "The Tunnel." A peculiar name remains in Düsseldorf, a legacy from the French occupation, where there is a café called "Railway Time." The French put the railway clocks at the occupied stations to western instead of Central European time, and from this the café was named.

Birmingham v. Reading	1
Plymouth v. Bristol	1
Cardiff v. Swansea	2

TWO HOME AND ONE AWAY—

THE CONSIGNEE
WANTS THEM
ALL HOME

These posters justify themselves if they cause you to think and act, for we do need your constant co-operation to perfect our services.

No. 3 of a series of "claims prevention" posters recently issued by the Chief Goods Manager, Great Western Railway, for exhibition to the staff

Two interesting facts emerge from the *North Western Railway Magazine* (India) for June, namely that (1) double-deck third class carriages were used 72 years ago on the Lahore-Amritsar section of the Punjab & Delhi Railway (now N.W.R.); and (2) that the track laid 45 years ago on the 1 in 25 and 1 in 33 sections of the famous Bolan Pass line to Quetta consisted of 100-lb. flat-footed steel rails on steel trough type sleepers with buttressed lugs, weighing 135 lb. each. Creep is said to have been unknown. It may be remembered that there are 16 miles of this broad gauge line having a 1 in 25 ruling gradient, and that the heavily graded sections are double tracked. The whole 59-mile line was completed in 1885 in the face of stupendous natural difficulties.

For 67 years the Virginia & Truckee Railroad has hauled gold and silver ore, with its operators all unconscious of the fact that a part of its roadbed concealed a vein valued at \$2,000,000. Recently a section of the railroad was moved across a canyon so that the Auto Tunnel Coalition can sink a shaft and recover the new wealth. The ore, which lies at various depths between the surface and the 300-ft. level, was estimated by Government engineers as worth \$10 to \$20 a ton, with an estimated recovery cost of \$3 a ton. In view of the present financial condition of many railways, we hope that this news will not cause wholesale line abandonment to permit prospectors to probe beneath the ballast.—From the "Railway Age."

OVERSEAS RAILWAY AFFAIRS

(From our special correspondents)

SOUTH AFRICA

Southern Africa Transport Conference

It is officially announced by the Department of External Affairs that a Southern Africa Transport Conference has been convened to take place in Johannesburg from September 7 to 14. The opening ceremony of the conference, at which the Minister of Railways and Harbours, Mr. O. Pirow, will preside, will be performed by His Excellency the Governor-General, the Earl of Clarendon. All the African territories south of the equator and Uganda will be represented at this conference by the respective Governors or Governors-General, General Managers or Directors of the various railway administrations and their staffs. The following chief executive officers have announced their intention to be present:—

Kenya: H. E. The Governor, Sir Joseph Byrne, G.C.M.G., K.B.E., C.B.

Uganda: H.E. The Governor, Mr. P. G. Mitchell, C.M.G., M.C.

Tanganyika: H.E. The Governor, Sir Harold MacMichael, K.C.M.G., D.S.O.

Zanzibar: H.E. The British Resident, Sir Richard Rankine, K.C.M.G.

Nyasaland: H.E. The Governor, Sir Harold Kittermaster, K.C.M.G., K.B.E.

Northern Rhodesia: H.E. The Governor, Sir Hubert Young, K.C.M.G., D.S.O.

Bechuanaland, Basutoland and Swaziland: Sir Cecil Florde will represent the High Commissioner for the United Kingdom.

Southern Rhodesia: H. E. The Governor, Sir Herbert Stanley, G.C.M.G., who will be accompanied by the Prime Minister, Mr. G. M. Huggins, and the Minister of Mines, Captain Senior.

Portuguese West Africa, Mozambique, Madagascar, and the Belgian Congo will also be represented.

RHODESIA

Empire Exhibition at Johannesburg

The Rhodesia and allied railways will be much to the fore in the exhibits at the forthcoming Johannesburg Exhibition. There will be a Rhodesia Railways stand and also extensive space in the Rhodesian pavilion devoted to models of the Zimbabwe Elliptical Temple, and of the Victoria Falls. The latter will be $\frac{1}{8}$ actual size and will measure 150 ft. in length. It will include the Rain Forest, the bridge, the hotel, spray clouds and rainbow. A relief map (13 ft. \times 11 ft.) of the Rhodesias and Nyasaland is also being supervised by the Rhodesia Railways.

In the Rhodesia Railways stand will be a variety of exhibits not only of the Beira & Mashonaland and Rhodesia Railways, but also of Rhodesian and Nyasaland Airways Limited, and of the Companhia do Porto du Beira (Beira Works Limited). Three dioramas are included, and scenes illustrating air and rail travel and port

activity will appear as enlarged, coloured photographs behind them on a semi-circular wall. Below these pictures will be a frieze in the form of a silhouette illustrating water and oxen-drawn transport and an early railway train, and above will be impressionist peeps into the near future, of transport in the air, on land and water.

ARGENTINA

Central Argentine One-Class Service

On June 29 the Central Argentine Railway introduced a new service of one-class trains at very cheap fares between Rosario and Cañada de Gomez. To provide maximum comfort at minimum cost, certain modifications have been made in the coaches, the interiors of which have been conveniently arranged; the exteriors are painted red, to distinguish them from the ordinary trains. The fares are in some cases less than half the second class rates at present in force, and the tickets—which are issued exclusively for these trains, and without the ordinary right to the free conveyance of luggage—are available for return until 8 a.m. on the day following their issue. Tickets issued on Saturdays and Sundays or on the eve of a holiday are available for return until the following Monday up to the same hour, or the first working day following the holiday. They can also be used for returning by second class on the ordinary trains within the same period. The distance between Rosario and Cañada de Gomez is 72 km., and with nine intermediate stops, the average time occupied on the journey is 1 hr. 20 min. There are 14 trains a day in each direction, in addition to 9 trains a day from Rosario to Roldan, an important suburb 25.6 km. distant, and 11 trains a day in the opposite direction. The single fare from Rosario to Cañada de Gomez is \$1.90 paper (approximately equivalent at current exchange rates to 2s. 1d.), and return \$2.90 (approx. 3s. 2d., less than a half-penny a mile). The corresponding rates between Rosario and Roldan are \$1.00 and \$0.85 (equivalent, respectively, to 1s. 1d. and 0s. 11d.).

Labour Troubles on the B.A.P.

The Buenos Ayres & Pacific Railway for the past month has been in conflict with its workmen over different issues, and the men, by putting the "working to rules" movement into operation, have caused endless trouble to their employers, and much inconvenience to the general public. The railway authorities, refusing to be dictated to by the railwaymen's union, went to the length of closing their workshops at Junin and Alianza, in response to

the men's habit of enforcing periods of inactivity during the hours in which they are supposed to be at work, and dismissed the ringleaders of the movement. Fortunately, the Government has supported the railway, and on June 28 gave the union 48 hours in which to normalise the situation by instructing its members to fulfil their obligations in a right and proper manner, so that their alleged grievances could be the subject of investigation. This ultimatum, which showed plainly that the authorities would not tolerate any further interference with the railway service, had the desired effect, and before the expiration of the time limit, the Union Ferroviaria notified the Director-General of Railways that, in compliance with the Government's orders, it had advised its members to return to duty forthwith. On June 30 it was officially stated that the train service was again working normally.

Engineering and Transport Meetings

The second quarterly meeting for the current session of the South American Centre of the Institution of Locomotive Engineers was held in Buenos Aires on June 26, when a paper on "Locomotive Wheels, Tyres and Axles" was discussed. Mr. Ormond Steven, M.C., M.I.Loco.E., Chief of Operation, B.A.G.S. and B.A.W. Railways, who presided, opened the discussion. Others who took part in it were:—

Dr. H. T. Haworth, M.Sc., D.Ph., B.Eng., Messrs. P. L. Falconer, F. Davis, W. Topham, B. G. Watts, H. V. M. Fell, E. J. Beckwith, F. Campbell, W. P. Deakin, C. E. Prescott, and E. C. Noble.

At the termination of the discussion, Mr. W. P. Deakin, Chief Mechanical Engineer, Central Argentine Railway, proposed a vote of thanks to Mr. C. R. S. Harris (Director-General, B.A.G.S. and B.A.W. Railways) for giving the members permission to visit the B.A.W. Railway locomotive works at Liniers, and also to the Chief Mechanical Engineer of both railways (Mr. J. W. H. Rea).

The members then adjourned to luncheon at the restaurant of the B.A. Western Railway at Plaza Once terminus, and were afterwards conveyed by special diesel railcar to Liniers, where a tour of the workshops was made, and the two 140-h.p. diesel units, recently acquired by the railway, were inspected. The visitors were subsequently entertained to tea, and finally conveyed back to Once terminus by diesel railcar.

The same evening, Mr. R. Flack, A.M.Inst.T., Chief Accountant, Central Argentine Railway, read an instructive paper before a largely-attended meeting of the Argentine & River Plate Centre of the Institute of Transport on "An introduction to standardisation in the accounts of the British-Argentine railways." Mr. J. G. Mayne (Director, Percy Grant & Co. Ltd.) presided, and amongst those present were Messrs. Ronald Leslie

(General Manager, Central Argentine Railway), and R. Montgomery (Chief Accountant, B.A.G.S. Railway). Mr. Flack, after introducing his prosaic subject in a light and entertaining style, outlined the technical side of the new system of accounting, dealing in more or less detail with the various departments of the railway and the methods of treating their special problems. At the termination, the lecturer was the recipient of a hearty vote of thanks.

Harvest Statistics

A revised or second estimate of the cereals and linseed harvest for 1935-36 has now been issued by the Ministry of Agriculture, and is shown in tabular form (in thousands of tons) below, compared with the first estimate which was published in THE RAILWAY GAZETTE of January 31 last:—

	Wheat	Linseed	Oats	Barley
First estimate ...	3,920	1,280	500	480
Second estimate ...	3,800	1,330	520	460
Difference:—	120	+ 50	+ 20	- 20

INDIA

Transport Advisory Council

In opening the second meeting of this council at Simla on July 13, the Viceroy, Lord Linlithgow, prefaced his address with a number of most cogent warnings with regard to the effect of road competition upon railway rates, and therefore upon economic development and prosperity generally. [These were recorded as a news article on page 127 of our issue of July 17.—ED. R.G.J.]

Continuing, His Excellency assured the council that the Government of India would strive constantly both to improve the services of all kinds available to the public, and to effect all possible economies in their management. He exhorted the delegates to approach their difficult task in a spirit of goodwill and co-operation, and hoped that they would succeed in recommending a workable policy whereby road and rail, as complementary systems of transport, might be further developed for the benefit of the people of India.

Railway Operating Results

A press note by the Government of India sets forth approximate results of railway working during the year ended March 31, 1936. For the greater part of the year railway revenues suffered a more or less steady deterioration as compared with the previous year, but thanks to a remarkable change towards the close of the fiscal period, the final gross traffic receipts for 1935-36 amounted to Rs. 90.66 crores, or about half a crore more than in the previous year. Ordinary working expenses (excluding depreciation) amounted to Rs. 50.75 crores, or half-a-crore more than in 1934-35. As the increase due to the withdrawal of the general cut in wages and salaries amounted to Rs. 90 lakhs, there was really a decrease of about

Rs. 40 lakhs in expenditure. With due allowance for depreciation and after taking into account the result of miscellaneous transactions, the net revenue available for meeting interest charges was nearly Rs. 27.5 crores, about Rs. 75 lakhs more than in 1934-35. The total interest payable was reduced by Rs. 38 lakhs to Rs. 31.42 crores and the deficit for the year amounted to approximately Rs. 4 crores, this being over a crore less than the deficit for 1934-35 and about half-a-crore less than the revised estimate made in February last.

The actual balance at credit of the depreciation fund amounted to Rs. 9½ crores; and the nominal balance to Rs. 41 crores. The operating ratio for the year was 56, about the same as in the previous year. The return on capital outlay was 3.44 per cent. against 3.36 per cent. in 1934-35.

Third Class Passenger Amenities

Though conditions of third class travel on Indian railways have been criticised for years past, budget figures show that the railways spend a very considerable sum every year in the provision of amenities for lower class passengers. The reservation of third class seats is an innovation that the East Indian Railway has been trying for some months past. During the Puja and Christmas holidays in 1935, intermediate class passengers were allowed the privilege of reserving their seats on payment of a small charge of four annas (4d.) a seat. Encouraged by the results of these experiments, the administration decided in April last to allow third class passengers travelling from Howrah (Calcutta) to reserve their seats a day in advance on certain of the more important trains on payment of the same charge. The facility was greatly appreciated and no fewer than 4,000 passengers booked their seats in April, and the number was nearly doubled in the following month. This measure having proved so attractive, the railway has now extended the facility of reservation to third class passengers travelling from Dehra Dun, Hardwar and Rikhi-kesh and to passengers travelling by one train from Benares to Howrah. It is intended to apply the scheme gradually to other stations on the E.I.R. The scheme, however, is feasible of adoption only at stations at which trains originate or through-service carriages are attached. To enable the passengers to obtain the full benefit of this facility, the railway will have to provide additional station staff to guide passengers to their reserved seats.

Chief Commissioner's Tour

Sir Guthrie Russell, Chief Commissioner of Railways, and Mr. P. R. Rau, Financial Commissioner, will leave Simla on July 23 to visit Calcutta, Madras, Bombay and Lahore. Apart from consultations with the railway agents, and meetings with representatives of commerce and industry at these places, the

Finance Commissioner will preside over a meeting of the Standing Finance Committee for Railways to be held in Calcutta on July 27. The rolling stock programme for 1937-38 will form the principal item of business on the agenda of this meeting.

Further Flood Havoc

Heavy rainfall in Northern India has again caused considerable dislocation of railway services. On July 12, the East Indian Railway Unao-Balamau and Rosa—Sitapur Cantonments branches were breached. In neither case was transshipment possible and through booking had to be suspended, but shuttle services up to the breaches were instituted. A bridge on the Cawnpore-Banda section of the G.I.P.R. was rendered unsafe for the passage of trains and through communication was impossible for about three days. Numerous houses in these neighbourhoods collapsed as a result of continuous heavy downpour. Rivers are in high flood; and the water level of the River Gumbi in the neighbourhood of Lucknow is reported to be nearing the limit of safety.

EGYPT

Whittaker Automatic Staff Exchanging Apparatus

It has been agreed in principle that the Whittaker automatic staff exchanging apparatus shall be adopted for single-line working on the main lines in Egypt, and it is understood that the first installations are to be fixed at El-Cap, Tina, Ras El-Esh, and Roswa B.P. between Kantara West and Port Said.

Combined Rail and Hotel Excursions to Port Said and Ras El-Bar

As from July 4 and July 11, weekly excursion trains will be run to Ras El-Bar and Port Said alternately, until further notice. The outward journey will be made on Saturday afternoons and the return on Sunday nights. The Ras El-Bar excursions will return from Dumyat.

Under an arrangement made with the hotels in Port Said and Ras El-Bar, combined railway and hotel coupons will be issued at reduced rates, including the return journey, hotel accommodation, and meals.

SWITZERLAND

Staff Reductions

On June 30, 1936, the total staff of the Swiss Federal Railways numbered 28,809, as against 30,031 at the end of June, 1935. The reduction of 1,222 employees concerned the following services: administration, 44; track construction and maintenance, 169; electrical equipment, 37; stations, goods service, and warehouses, 233; trains, 368; traction and workshops, 300; and various, 71. This reduction is chiefly due to rationalisation and improve-

ments in working methods, and not to a falling-off in traffic. In 1929, with an average of 33,532 employees, 39.8 million train-kilometres were run on the Federal system, whereas in 1935 the figures were 29,834 and 41.2 millions respectively. The average number of train-kilometres per employee amounted to 1,015 in 1913, 1,175 in 1929, and 1,380 in 1935.

KENYA & UGANDA

Continued Traffic Improvement

During the first five months of 1936 the total public goods traffic handled amounted to some 14 per cent. more than in the corresponding period of 1935, the figures being 445,957 tons as against 390,354 tons January to May, 1935. The corresponding export traffic railed to the coast was 244,286 tons as compared with 190,633 tons last year, an increase of over 28 per cent. In the other direction the total traffic railed from Kilindini harbour by the end of May this year amounted to

55,719 tons as against 40,641 tons last year, an improvement of 37 per cent.

The total train-mileage run during the five months was 1,217,488 in 1936 and 1,057,628 in 1935, or 15 per cent. more train-miles.

INDO-CHINA

North-South Trunk Line Nearing Completion

The last stage in the construction of the great longitudinal railway from Hanoi, in the north, to Saigon, in the south, has been reached, and it is expected that the remaining gap between Tuyhoa and Nha-trang will be completed in October. The first part of this 1,080-mile trunk line was completed in 1905, when the 199-mile section from Hanoi to Vinh was opened. This was followed by the opening of the 108 miles between Dongha and Tourane, an isolated section. Construction on the southern section was begun some years before the war, and by 1913 the 252 miles from Saigon to Nha-trang and a portion of the

Dalat branch were completed.

Definite proposals for connecting these isolated lines were drawn up after the war and work begun immediately. Dongha and Vinh were linked together by a 186-mile line built in 1922-27, but south of Tourane the work was postponed until 1932, and construction has been undertaken from the northern end only. The section from Tourane to Quang Ngai was opened in 1934; Quang Ngai to Quinhon in 1935; and Quinhon-Tuyhoa in January, 1936. The remaining gap of 110 miles is being closed as quickly as possible.

Construction of a trans-Indo-China line from Tanap to Thakek was begun over three years ago, but only 12 miles out of Tanap have been completed. Rails have been laid for 8 or 10 miles out of Thakek,

but are not used, and for the past two years construction has been suspended for financial reasons. But an electric telfer line has been built for 25 miles from Xomcuc to Ban Naphao, and this is being used to transport materials for the construction of a road to the Siamese frontier. It has a capacity of 10 tons an hour and a speed of 500 ft. a min.

U.S.S.R.

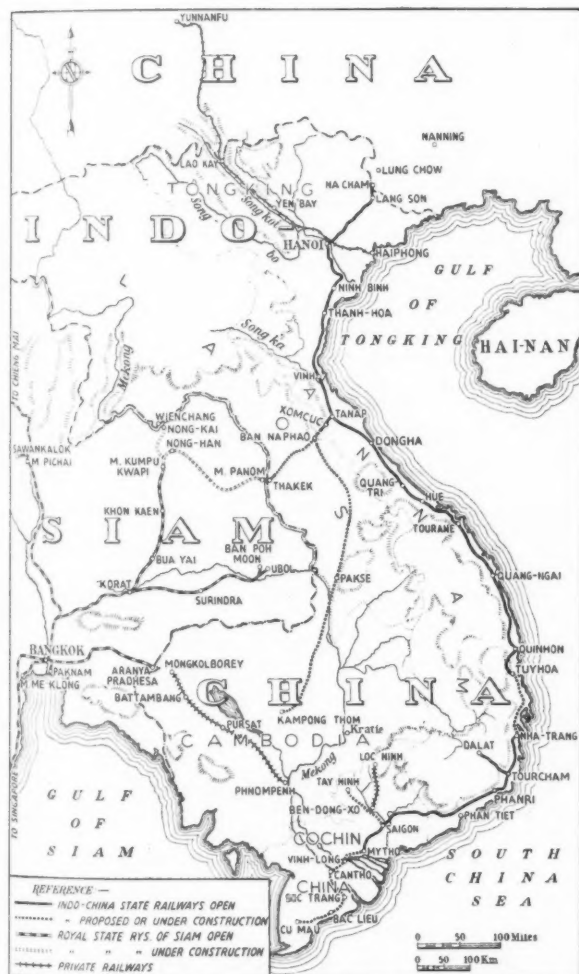
New Passenger and Freight Timetable Schedules

With the introduction of new timetables on May 14, the average speed of passenger trains has been raised to 33.3 m.p.h., and important express accelerations have taken place. The Moscow-Sevastopol and Moscow-Tiflis expresses, for instance, are now seven and twelve hours quicker between terminals; also the numbers of trains have been increased on most lines. Conveniences, too, have been increased, all important fast trains now having dining cars, and additional sleeping accommodation is also provided in many instances. The average speed of freight trains has also been raised to 20 m.p.h., and their maximum loading by 15 per cent. on several of the main lines, states the *British Russian Outlook*.

Second Moscow Underground Line

It is reported through official channels that the second line of the Moscow Metro system is now being pushed ahead rapidly at a speed double that achieved on the first line. It entails 19,600 metres of tunnelling, but for this work 41 shields are stated to be available, all of them fabricated in Soviet workshops, whereas on the first line only two shields were used, one of them having been imported from England. Of these, 12 shields will be used for the stations on the new line, whereas stations on the first line were excavated entirely by manual labour. A total weight of 235,000 tons of cast iron segmental lining will, it is said, be used on the second line, but, thanks to improved construction methods and plant, it is estimated that the cost per metre of the new tunnel will be only 33 per cent. of that on the original line. It is hoped that before the end of 1937 this new nine-mile tube will be completed.

If present progress is maintained, the spur joining Smolenskaia Ploshad to the Kiev station is expected to be ready for opening on January 1 next. Also, the line connecting the centre of the city with the Kursk station should be finished by July, 1937. Another line, running northwards below Gorki Street towards the Baltic station and the suburbs beyond will, it is anticipated, be ready for traffic by August of next year. When completed the second line will link up seven railway stations and will provide rapid transport from the centre of the city to the Dynamo stadium.



Sketch map of French Indo-China and neighbouring countries showing north-south line and other railway developments

THE RAILWAY WAGES DECISION

The finding of the Railway Staff National Tribunal is that the percentage deduction shall be $1\frac{1}{4}$ instead of $2\frac{1}{2}$, and that the standard overtime rate be restored

THE Railway Staff National Tribunal, which has been hearing claims by the National Union of Railwaymen and the Railway Clerks' Association with regard to the percentage deductions from earnings and variations in certain conditions of service now in operation, has communicated its decision, dated July 27, to the trade unions and to the railway companies. The Special Joint Committee on Machinery of Negotiation for Railway Staff (35, Parliament Street, S.W.1) has published a document, price 2s. 6d., which embodies an introductory statement, a summary of the cases presented to the tribunal by the respective parties, and the decision; the last-named is prefaced by a report in which the tribunal reviews the changes in the railway situation since 1931, and indicates the grounds upon which its findings have been reached.

The decision provides that the deduction of $2\frac{1}{2}$ per cent. from all earnings shall be replaced by a deduction of $1\frac{1}{4}$ per cent.; and that, so far as conciliation grades are concerned, the standard rate of time-and-a-quarter for overtime shall be restored in place of the present time-and-an-eighth. The other special rates for night duty and Sunday duty worked by conciliation grades will remain as at present. The decision is to operate for a year, from the first full pay following August 16, and continue thereafter until modified by agreement or later decision.

The tribunal was created by the agreement between the companies and the unions, dated February 26, 1935, which set up a new and elaborate machinery of negotiation, culminating in the tribunal itself. This body consists of three members not connected with the railway industry. For the recent hearing the members were Sir Arthur Salter, K.C.B., D.C.L. (Chairman), appointed by the Minister of Labour; Mr. A. L. Ayre, O.B.E., J.P., appointed by the companies; and Mr. J. W. Bowen, J.P., appointed by the unions. The tribunal was assisted by four assessors: Sir Ralph L. Wedgwood, C.B., C.M.G., and Mr. G. L. Darbyshire, appointed by the companies; and Mr. J. Henderson, J.P., M.P., and Mr. F. B. Simpson, M.P., appointed by the unions.

Text of Report and Decision

Following is the text of the published report and decision (No. 1) of the tribunal:—

1.—This is the first claim dealt with by the tribunal, and we think it will be well to preface our decision by a summary of the circumstances in which it has arisen. In stating the facts which seem to us most significant in relation to the claim we do not desire to imply that we have taken account of no others. We have in fact carefully examined all the evidence presented by the parties.

2.—Those covered directly by a decision of the tribunal are of two main classes—(a) those employees on a weekly wage usually known as the "conciliation grades" and numbering about 320,000, and (b) salaried staff, numbering about 80,000—a total of 400,000.

3.—We are asked to decide whether what remains of certain deductions from earnings and variation of conditions based on the standard rates prescribed in the national agreements of 1919-22, which were fixed by the National Wages Board in March, 1931, (Decision No. 119), should now be terminated.

That decision (excluding certain detailed adjustments and omitting decisions on certain matters not now in issue) provided for a percentage deduction of $2\frac{1}{2}$ per cent. from all earnings, with a further $2\frac{1}{2}$ per cent. from earnings over 40s. a week or (in the case of the salaried staff) £100 a

year. In addition, in the case of the conciliation grades it substituted time-and-an-eighth for the standard rate of overtime of time-and-a-quarter, a "night duty" rate of time-and-an-eighth for time-and-a-quarter and a night overtime rate of time-and-a-quarter for time-and-a-half. It also reduced the Sunday duty from time-and-a-half to time-and-a-third, or where double time had been paid to time-and-two-thirds. The decision was to be operative for a year and to continue thereafter until altered by agreement or, failing that, by later decision.

In fact it remained operative until it was changed by the agreement of August 10, 1934. This agreement reduced the further percentage deductions on earnings over the prescribed amounts from $2\frac{1}{2}$ per cent. to $1\frac{1}{4}$ per cent. for the last three months of 1934 and then terminated this $1\frac{1}{4}$ per cent. from January 1, 1935. Since then what has been in force is the general $2\frac{1}{2}$ per cent. deduction from earnings and, for conciliation grades, the reduced rates for overtime, night duty, and Sunday duty.

The monetary effect of the original award was estimated at about £3.6 millions for a full year for those directly covered, or £4.5 millions including the indirect effects on other classes. The effect of the 1934 agreement, when fully operative in 1935, was to reduce the above figures by about £710,000 a year for those directly covered or £1.1 millions in all.

Monetary Effect of Full Union Claims

It is estimated that the monetary effect of granting the full claims now put forward (allowing for changes in numbers of personnel) would be: Percentage deductions, £1,720,211; Overtime, night duty and Sunday duty rates, £1,250,071; or approximately £3 millions; the total cost involved, including the indirect effects, being about £3½-£3¾ millions. This is the claim with which we have to deal—to reject, to grant, or to grant in part.

4.—The claim being for the termination of certain deductions on earnings and variation of conditions based on the standard rates as laid down in the national agreements, we are not called on to consider these rates themselves or the remuneration allocated to the different grades. For our purpose we must take all the employees' grades as one, all the companies' finances as one, without distinction between the more and less prosperous companies—and similarly all investors as one, without distinction as to different forms of holding (debenture, preference, ordinary, &c.) In effect we have to consider any decision as affecting the distribution of what is known as the "net product of the industry" between those working in it on the one hand and (through the companies) the investors on the other.

5.—The claim being for the termination of what remains of a decision given in March, 1931, we must naturally take as a starting point the circumstances of that time and consider what has happened since. We will therefore sketch in broad outline what has been the course of developments in the last five years.

In March, 1931, the standard rates and conditions were in operation, the temporary deductions arranged in 1928 having come to an end about a year before. Receipts had been falling during 1930, as the previous difficulties of the British economic situation and of the railways in particular were increased by reactions from the deepening world depression of that year. The National Wages Board had before it the completed accounts for 1930, showing a decline in net revenue from £45 millions in 1929 to £37.7 millions in 1930 (which would have been from £42.3 millions to £36.7 millions if there had been no deductions in operation). The general movement was downward and, in making their decision, which was to operate in the first instance for

a year, and thereafter to be continued until modified by agreement or later decision, the board had before them evidence indicating the probability of a further serious decline. They could not, however, have anticipated the much steeper decline which was to follow the world financial crisis of the summer and autumn of 1931 and which brought the net revenue for that year down to £33.4 millions, and for 1932 to £26.4 millions in spite of the new deductions from earnings. In 1932 the railway companies sought to secure an increased rate of deductions but, the Wages Board having failed to agree, no further change was made. In 1933 an upward movement began, though it was much slower than the previous fall, the net revenue figures being (1933) £28.8 millions, (1934) £31.5 millions, and (1935) £32.9 millions.

In comparing these figures with the prospects before the National Wages Board for the year in which their decision was first to operate, we must remember that they are higher by the effect of that decision. Without it the net revenue for 1935 would have been £29.3 millions and if we further eliminated a sum of £1.1 millions included in that year in respect of anticipated rating relief (which we discuss later) it would have been £28.5 millions. For the first six months of this year (1936) the gross railway traffic receipts of the companies increased by about £2 millions by comparison with the corresponding months of last year. The companies, however, estimate that in consequence of increased expenditure, the net receipts only exceed those of the first part of last year by £475,000.

As the contrast in these figures will be in the minds of those concerned, we think it well to make this comment. It is obvious that the gross receipts give an exaggerated impression of the improvement. We believe, however, that it is also true that the estimated net receipts have the opposite defect. They reflect expenditure which is in part the accompaniment of expansion and in part represents arrears of work deferred during the worst period and now urgently required. The increased traffic does represent a real improvement this year, and we may add that the weekly figures during this month again confirm this impression.

Two facts stand out clearly from this brief review. The first is that the actual results before us as we met still showed a decline on those before the National Wages Board in March, 1931, and indeed upon any estimate they could reasonably have made for the year ahead of them. The second is that whereas the general movement in 1931 was steeply downward, it has since 1933 been definitely, though more gradually, upward. We are concerned with the past, not in itself, but as an indication of the future; it is the reasonable prospects for the period in which any award would be operative that we must consider.

Railway Prospects

6.—As regards *prospects*, there are some favourable factors which should be taken into account. In the first place, if the general upward movement is continued, it should give better results for the year from the summer of 1936 to that of 1937 than for the last twelve months. In the second place, the prospect of rating relief is an important factor. This subject is still a matter of negotiation and no exact calculations are yet possible. We do not consider, however, that because the exact extent of the prospective relief is unknown we should ignore this factor. We must form the best opinion that is possible in the circumstances. The best indication we have is afforded by the sums included under this heading by two companies in their 1935 accounts amounting to £1,135,000. If this estimate is correct and if the other two companies obtain a similar relief (proportionate to their earlier assessments) the full relief in a year would amount to about £2 millions. In addition there will be a claim for arrears back to 1931; the extent to which this will be recoverable is, however, uncertain and we may properly regard it as a set off against the losses of the years in question and the consequent withdrawals from reserves. (In other words, we may in reviewing the sum distributed to investors during those years disregard the extent to which reserves were used for the

purpose.) We must therefore include in our estimate for the future the sum of about £2 millions under this heading, that is almost £1 million more than what was included in the 1935 accounts.

7.—In relation to this financial situation it will be well to consider the changes in the respective remuneration of the workers and the investors. The effect of the decision of March, 1931, was to reduce earnings of conciliation grades by an average of about 3s. 7d. a week which was brought down to about 3s. 2d. a week by the agreement of 1934 when fully operative from January, 1935, to the present date. In addition, certain losses, not capable of statement in a similarly precise form, resulted from the staff economies (which we discuss below in paragraph 8).

We do not consider that in comparing the situation of March, 1931, with subsequent developments, we need take differences in the cost of living into account as a factor. The difference in the "cost of living" index between March, 1931, and the present month is a small one—150 as compared with 146; and this slight difference (which incidentally affects the purchasing power of dividends as well as wages) is in our view offset by other considerations—for example, the tendency of rents to be a more serious factor in the conditions of the railway worker's life (especially in case of transfer during the period of economies) than is allowed for in the present index.

Distribution to Investors

The remuneration distributed to investors, which had averaged 3.66 per cent. in 1930, fell to an average of 3.17 per cent. for 1931, 2.58 per cent. for 1932, 2.76 per cent. for 1933, 2.97 per cent. for 1934, and 3.08 per cent. for 1935. These figures are calculated on the amount of capital (approximately £1,090 millions) received in actual cash, which is in fact almost exactly equal to the nominal capital—the difference for example if the latter basis was taken being only as between 3.08 per cent. and 3.06 per cent. for 1935. We have taken the averages for capital as a whole without distinguishing between debenture, preference and ordinary stockholders, the latter of whom have in many cases received no dividends for a long period, since for the reasons already stated we feel bound to regard the distribution of the "net product" between workers as a whole and investors as a whole without distinction as to the varying rights within the general class. The amounts paid to the investor would have been less if the dividends had not been in some cases supplemented by withdrawals from reserves, but for reasons we have given in paragraph 6 we think this factor need not at this point be taken into account.

We should also remark that there has since 1931 been a change in the normal expectation of return on capital outside the railway industry, this fact being expressed in a higher selling value of both railway and other securities carrying the same rate of interest then and now. This consideration must not be put too high since a higher quotation on the stock exchange does not increase the holder's income—whether he retains his holding or sells it for re-investment.

8.—If the above factors stood alone they would scarcely justify a greater modification in the decision of March, 1931, than was made by the agreement of August, 1934. There are, however, two further considerations still to be taken into account.

First, we are impressed by the fact that deductions, intended to be temporary—though no term was fixed—from earnings based on the standard rates have now been in operation for over five years. We feel that, other things equal, the case for returning to the standard rates becomes stronger with time.

Secondly, we feel that some account must be taken of the effects of staff economies in inflicting losses of one kind or another on the staff to a greater extent than can have been reasonably anticipated in March, 1931. We have indeed been much impressed by the elaborate arrangements, made by the companies in close co-operation with the unions, to ensure that reductions in personnel should be so arranged as to cause the least possible hardship and injustice to those in the service. In effect the normal machinery of promotion was, as regards the conciliation

grades, put "into reverse," those redundant in higher grades being reduced in grade as an alternative to dismissal, the net reduction being effected to the utmost extent by stoppage of recruitment and by retirement, and actual dismissals being confined to the youngest men and being reduced to small numbers even at the worst period. We are happy that the process has now been reversed again, and men are being rapidly restored in grade. It remains true, however, that there must be some continuing effect, those restored to their grades being still some years behind what would have been their normal progress.

9.—In these circumstances, and taking into account not only the facts set out above but also the other evidence presented by the parties, we have come to the conclusion, as defined in detail in the formal award which follows, that there shall be a deduction of $1\frac{1}{2}$ per cent. from earnings instead of the present $2\frac{1}{2}$ per cent., and that the standard rate of overtime of time-and-a-quarter shall be restored instead of the present time-and-an-eighth, the decision as a whole being operative as from the middle of August, 1936, for a year.

This would not preclude either party asking for a review of the situation before the termination of the twelve months and in ample time to enable any further change, if justified, being made operative at the termination of that period.

The Finding

10.—We find as follows:—

(A) CONCILIATION GRADES

Earnings.—A deduction of $1\frac{1}{2}$ per cent., instead of the present $2\frac{1}{2}$ per cent., shall be made from all earnings subject to the following adjustments:—

Earnings under 40s. 6d. in a full week . . . No deduction

Earnings of 43s. 11d. up to 44s. 6d. in a

full week 6d.

We recommend that minor variations in respect of earnings between 40s. 6d. and 43s. 11d. shall be agreed between the parties. In no case shall any deduction exceed the sum of 8s. in respect of a week.

Overtime.—The standard rate of time-and-a-quarter for overtime shall be restored in place of the present rate of time-and-an-eighth. Overtime worked between 10 p.m. and 4 a.m. will thus be paid at the rate of quarter time extra in addition to the present night duty rate of time-and-an-eighth, making time-and-three-eighths in all. Save as provided above we decide, as regards the matters submitted to us, to make no change.

(B) CLERICAL, SUPERVISORY AND OTHER SALARIED STAFF AND STAFF PAID ON A SALARY EQUIVALENT BASIS

A deduction of $1\frac{1}{2}$ per cent., instead of the present $2\frac{1}{2}$ per cent., shall be made on all earnings, provided that in no case shall any deduction exceed the sum of £7 10s. in respect of a year.

This decision (No. 1) shall be operative as from the beginning of the first full pay following August 16, 1936, to the first full pay following August 15, 1937, and shall continue thereafter until altered by agreement between the parties, or a decision is arrived at in accordance with the procedure laid down in the memorandum of agreement of February 26, 1935, with regard to the machinery of negotiation.

The railway companies and the trade unions will consider the decision of the tribunal, and it is understood that a special delegate conference of the National Union of Railwaymen will meet in London for this purpose on August 11.

The Birmingham Battery and Metal Company

Last month the Birmingham Battery & Metal Co. Ltd. celebrated its centenary, and, to the general interest attaching to such an event, is added the unusual feature that the firm has continued from the beginning under an unbroken line of family management. The name Gibbins had been associated with banking and the metal trade long before the formation of the company. It is believed that an earlier Gibbins had been interested in copper before the year 1793, when Matthew Boulton of Soho, finding difficulty in obtaining supplies of copper for his mint, persuaded his friend, Joseph Gibbins, to join him in starting the Rose Copper Company at Birmingham. Four years later, that company bought a copper smelting works in Swansea from Fenton & Company, with which Boulton had been connected. Besides being interested in copper concerns Joseph Gibbins was a banker. He died in 1811 leaving several sons, at least five of whom were already associated with banking and the metal trade.

These five, two of whom were directors of the Birmingham Banking Company, together with eight other men interested in the metal trade (six of whom were also on the board of the Birmingham Banking Company) were the first proprietors of the Birmingham Battery & Metal Company which was formed on July 1, 1836, to take over an insolvent brass foundry in Digbeth, Birmingham, making wire, metal, and "battery" products, i.e., pans, bowls, kettles, and other holloware, fashioned

in those days (before the advent of stamps and presses) from sheet metal raised into shape by means of power-driven tilt hammers giving upwards of 200 blows a minute and operating in a group (termed a battery). The introduction of stamped and spun pans, which of course could be produced more cheaply, caused the general decline in demand for the hammered (or Battery-produced) pan, but, since the name was so well known, the company decided to retain the word "battery" in its title.

Mr. Thomas Gibbins, one of the sons, was appointed manager and retained the position for many years, during most of which he lived in a fine house in front of the works; the site is now occupied by Digbeth Institute. By 1837 the company was able to supply lap-jointed boiler tubes to early railway companies, and subsequently, for many years did a large trade in these and other tubes. In 1845 the business was registered as a joint stock company and, during the next few years, the Gibbins family bought out the other shareholders and so turned the undertaking into a family concern. In 1864, Thomas's son, William, became manager with a brother, Thomas, to assist him. By 1871 a new freehold site at Selly Oak had been bought, some buildings erected, and a canal basin cut. Within 20 years the new works was gradually extended and the Digbeth works finally closed down. During the transition time, Selly Oak works had been mainly under the able control of

another brother, Mr. John Gibbins, who continued for many years afterwards to manage the production side of the business. In 1897 shortly after the transfer to Selly Oak had been completed the firm became a limited company, with William, Thomas, and John as the first directors.

Along with general development, particular attention has been paid by the firm to the technical and metallurgical aspect of metal manufacture. A laboratory and a testing department was established which resulted in important modifications of method. Since the war many changes have taken place to meet the modern requirements of the railways and electric supply undertakings. Heavy rolls, together with accessory machines for making large plates up to 12-ft. wide, have been installed and the rod mill reorganised to increase the output of stay rods for the locomotive boilers.

Changes in the directorate have left unimpaired the continuous chain of family management. After 67 years, first as Manager and then as Chairman of the limited company, Mr. William Gibbins retired in 1923; the retirement of Mr. John Gibbins occurred in 1915. Mr. W. Waterhouse Gibbins became Chairman in 1923 and still retains the position, although he retired from active management in 1925. During the latter year Messrs. R. Lloyd Gibbins and Henry C. Gibbins were appointed Managing Directors. These three directors are all grandsons of the original Thomas Gibbins.

THE BOLOGNA DIRETTISSIMA AND FLORENCE NEW STATION

Certain features of this remarkable line, supplementary to those contained in our article of May 22, 1931, are now available

THE Bologna-Florence *direttissima* opened on April 22, 1934, is, like the earlier Rome-Naples *direttissima*, characterised by comparatively easy gradients and curves and by absence of level crossings. The old line, constructed about 60 years ago, between Bologna and Florence, crossed the Apennines at Porretta at a maximum altitude of 2,030 ft.

Many water courses have to be crossed by the new line necessitating a large number of bridges, of which the following are over 200 ft. in length:—

River.	Number of Arched Spans.
Savona	5 of 50 ft. and 1 of 20 ft.
Setta	7 of 66 ft. and 7 of 83 ft.
Scopa	12 of 50 ft.
Casone	14 of 40 ft.
Le Quercia	9 of 66 ft. and 2 of 27 ft.
Piastola	8 of 50 ft.
Fernetola	11 of 66 ft. and 1 of 40 ft.
Brasimone	3 of 83 ft. and 2 of 66 ft.
Setta	3 of 66 ft. and 3 of 40 ft.
Setta	5 of 40 ft. (skew)

The total length of the line carried by bridges and viaducts, 40 in number, is 4.457 km., and the length of the 31 tunnels which were necessary is 36.687 km. (22.8 miles). On the remainder of the line there is an almost uninterrupted sequence of retaining walls and heavy earthworks, the volume of the latter being nearly 7,000,000 cu. m.

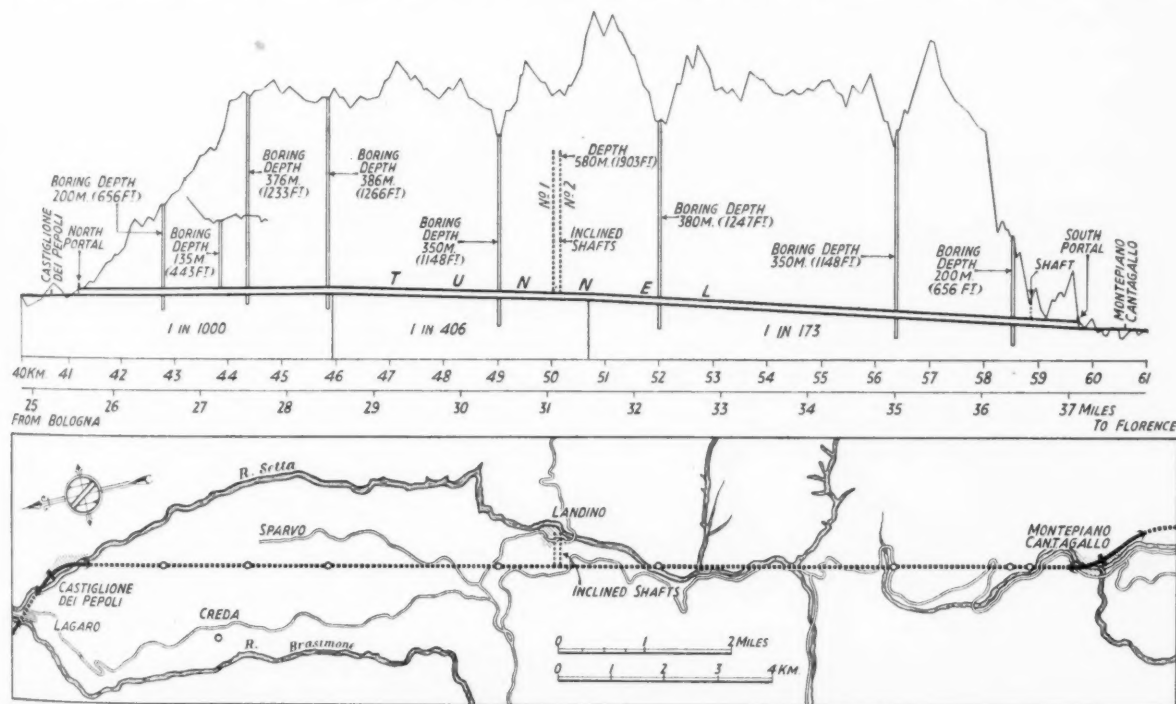
The main line is laid with 50.6 kg. per m. (102 lb. per yd.) rails, each 18 m. in length, and there are 30

sleepers to a rail length; the ballasting is approximately 2 ft. in depth. The gauge is 1,435 m. (4 ft. 8½ in.), increased on 35-37½-ch. curves to 1,440 m. (4 ft. 8¾ in.), and on curves sharper than 35-ch., to 1,445 m. (4 ft. 8⅞ in.). Superelevations of 12 and 13 mm. (½ in. and 5⅛ in.) respectively are given on the 40-ch. and 30-ch. curves, and all curves are transitioned.

The Apennine Tunnel

The principal feature of the line is the great Apennine tunnel, claimed to be the biggest tunnel construction in the world. Its length is 18,507 m. (20,239 yd. or 11½ miles), or 1,549 yd. shorter than the Simplon. The latter consists of two single line tunnels, whereas the Apennine tunnel is of the much larger section required to accommodate double track. Fourteen years were occupied in its construction. As preliminary borings indicated that the tunnel would have to be bored through treacherous ground, and therefore that work would be slow, it was decided to sink two shafts about midway, near Cà di Landino. These shafts are 1,683 ft. and 1,605 ft. long respectively and each has a cross section of 17 sq. m. (170 sq. ft.). An electrically-driven funicular railway was installed in each shaft and served for transporting the excavated material at the rate of 800 tons a day. The various pipes and cables for ventilation, electric light, and so on, were laid inside these shafts, which have been retained for ventilation purposes.

As mentioned in our previous article, two 0.95 m. gauge (2 ft. 5½ in.) service lines having a total route mileage of



Profile and plan of the great Apennine tunnel on the Florence-Bologna Direttissima

49 km. (30½ miles) were laid to the northern and southern tunnel entrances respectively. An aerial ropeway from the northern service line served the central shafts.

Three main construction yards were laid down, one at each end of the tunnel and one at the entrance to the central shafts. Each was equipped with its own power house and workshops. The great length and large section of the tunnel made it imperative that the ventilation of the works should be thoroughly efficient and provision had to be made for the delivery of 20 to 24 cu. m. of fresh air per second to the furthest working points. With the progress of the work and the increase in the volume of air required the completed lengths of the tunnel were divided into two sections by a longitudinal brick partition so that the fresh air was delivered on one side and the used air returned on the other.

In constructing the tunnel a bottom heading was driven first and a service railway worked by compressed-air locomotives laid in it. Then a top heading was driven and the excavated material dropped into trucks on the line below. The top heading was then widened out, brought

mixture to a total thickness of 1 in. The process proved entirely successful and the crown is now quite dry. As described in our previous article eruptions of gas and out-breaks of fire occurred during construction and seriously delayed the work. In one instance a fire caused so much damage that a section of the tunnel had to be sealed up with a strong bulkhead, and a small tunnel had to be constructed round it. It was seven months before this fire was extinguished. The worst obstacle to rapid progress was, however, water, which was encountered in exceptionally large volumes.

A unique feature of the great tunnel is the passing place built midway, between the shafts, enabling fast trains to overtake slow ones which are shunted on to sidings 1,470 ft. long, in tunnels branching from an enlarged section of the main tunnel. This large tunnel section is 153·96 m. (505 ft.) long, 9 m. (29 ft. 6 in.) high, and 17 m. (56 ft.) wide. The section of the great tunnel varies according to the nature of the ground. The height between crown and invert varies from 7·40 to 7·90 m. (24 ft. 3 in. to 26 ft.), the thickness of the crown from 0·54 to 1·02 m. (21 in. to 40 in.), and of the inverted arch from 0·40 to 0·81 m. (15½ in. to 31½ in.). The crown of the enlarged tunnel at the passing place is 1·23 m. (48 in.) thick, and the invert 1·02 m. (40 in.) thick. Brief details of the great tunnel, in relation to half-a-dozen important Alpine tunnels, are tabulated in an editorial article on page 213.

Besides the great Apennine tunnel there are 30 other tunnels on the new line totalling 18,180 m. (11·2 miles) in length, of which the Monte Adone tunnel is 7,035 m. (7,693 yd.), and the Pian di Setta tunnel 3,052 m. (3,337 yd.). In the construction of the latter serious difficulty was encountered owing to subsidences, the pressure of which broke down even the strongest timbering and which sometimes destroyed the masonry lining of the crown after its completion, but before the finishing of the haunches. Gas and fire troubles also caused delays.

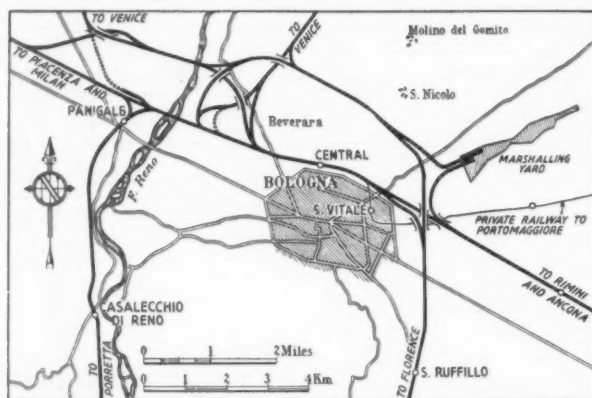
Elaborate housing and sanitary arrangements were installed in connection with the construction, and complete new villages to house the thousands of workmen and their families had to be built. It speaks well for the efficiency of these arrangements that not a single case of "miners' disease" occurred, although the whole area was infected with the bacillus.

There are seven intermediate stations on the new line, which joins the old Porretta line at Prato where a completely new station has been constructed 660 yards to the south of the old one. The work of laying out the new station was complicated by the necessity of raising the track of the Porretta line by about 15 ft. without interrupting traffic. Besides the passenger lines there are goods sidings and a goods yard.

Bologna station has been enlarged by the addition of two main platforms, and, to avoid traffic congestion, a new goods loop line about 10 km. long round the town has been built. About midway on this loop there is a branch to the great horticultural cold storage warehouse from which fruit and vegetables are distributed all over Europe.

The line is electrically equipped for 3,000 volts, d.c. operation, and a description of this part of the work was contained in our *Electric Railway Traction Supplement* of May 4, 1934.

The total cost of the new line has amounted to approximately 1,122,000,000 lire (£18,700,000), at 60 lire to the pound. The work was carried out by the Department of Railway Construction of the Ministry of Public Works, which is directed by Senor G. B. Fortziati, whose outstanding qualities as engineer and organiser have so successfully overcome the tremendous difficulties encountered.



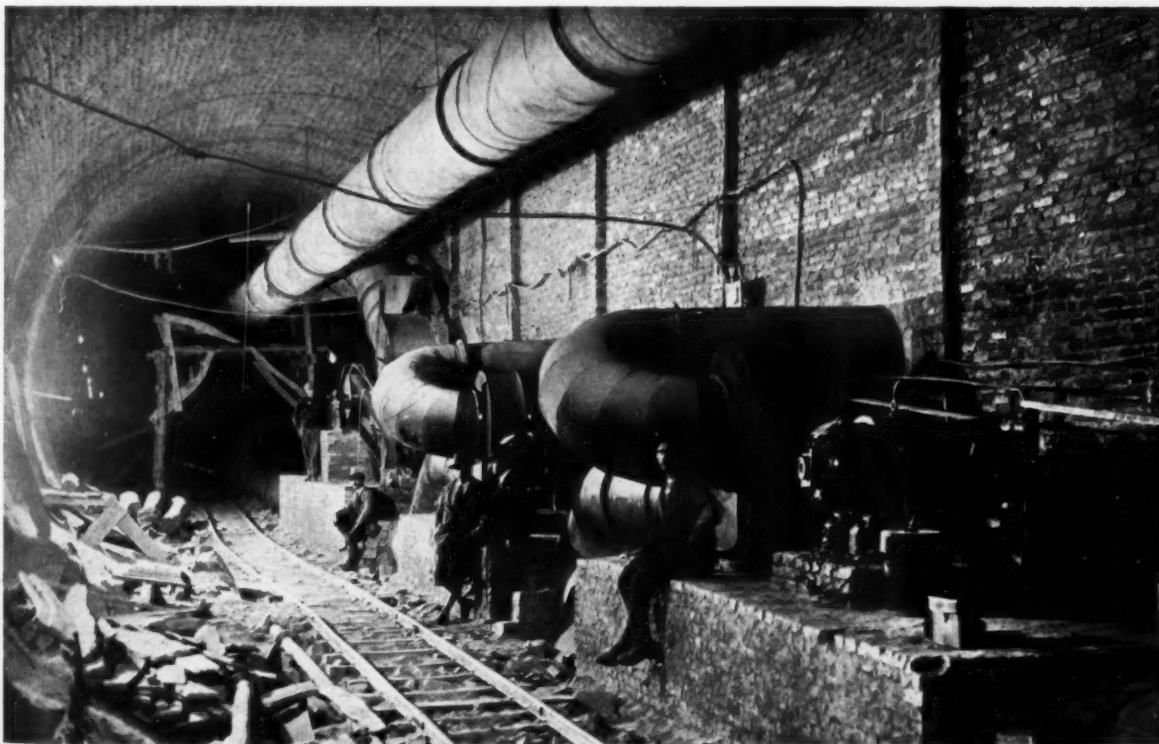
Sketch plan of the present arrangement of lines in neighbourhood of Bologna, showing the avoidance of crossings on the level by the direttissima

down to the springing of the arch, centred and finally enlarged to full section. Next the diaphragm between the top and bottom headings was removed, the bottom heading widened in successive stages and finally the inverted arch was put in. To overcome difficulties due to crushing the timbering, a new method, known as the Italian method, of constructing the bottom heading was devised. From one of our illustrations it will be seen that a circular bore was excavated and lined with wooden wedges. This method made it possible to increase the rate of progress from 50 m. to 90 m. a day.

During the lining of the tunnel special measures were taken to collect the water in drain pipes fitted between the lining and the live rock. Where a big area was affected the back facing was lined with galvanised sheets, and the interstices between the sheet and rock filled with rubble. Despite these measures water continued to penetrate practically throughout the length of the tunnel, a feature specially objectionable for electric traction. A system of waterproofing which had given excellent results on the underground line at Naples and in other tunnels was therefore adopted here. A mixture of cement and sand was injected through holes along a width of 23 ft. of the crown; the surface of the crown was then cleaned and washed with water under pressure, and the pointing removed from the joints in the masonry by means of pneumatic tools. To this clean surface was then applied a waterproofing



Bottom heading at the north entrance where the special Italian method of wedge-shaped wooden blocks was used to form the heading arching



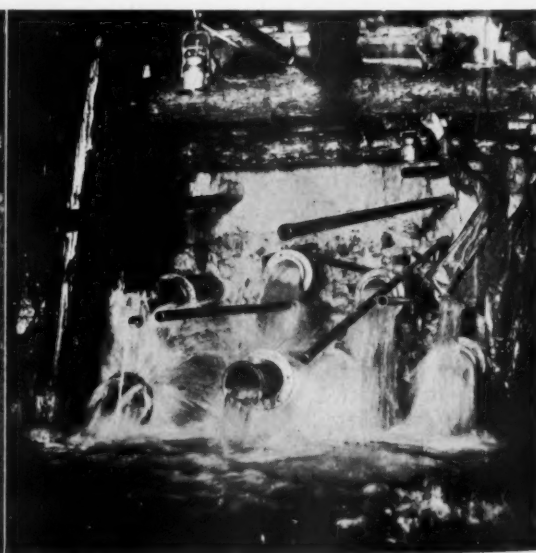
Subsidiary ventilation plant in the construction of the great Apennine tunnel on the Florence-Bologna direttissima



Viaduct over the Setta in course of construction and, in the right background, the service line carried over the river on a concrete low-level bridge



Left: Temporary tunnel diversion to avoid section affected by the great fire flowing at the rate of 300 litres a second



Right: Water encountered in tunnel



The new station at Florence, designed by a panel of six architects

Right: The exit hall and baggage office at Florence



Left: The approach to the platforms. The flooring is of marble; the unglazed portion of the roof is of sheet copper

He was assisted in his difficult task by a staff of able engineers, to whom great credit is due, as it also is to the thousands of men who, often at the risk of their lives, have performed many feats of endurance, sometimes working waistdeep in torrent-like waters when all mechanical means had failed, at others fighting seemingly inextinguishable fires, and subjected to explosions, collapsing timbering and masonry, and to poisoned air. The monumental fountain, erected in the station square at Bologna in memory of the 92 men who lost their lives during the work, is a lasting tribute to them.

We are indebted to Signor Forziati as well as to the General Manager of the State Railway, Signor Velani, for the illustrations accompanying this article.

The New Station, Florence

The discussions, often very bitter, during the construction of the new railway station in Florence, ended in

in 1848, was illustrated on page 106 of our issue of January 18, 1935. From a technical point of view, the work of the architects is of great importance. All the latest methods have been applied for controls, heating, and for silencing the noises of a large station. The electrically operated controls are of the newest kind and are perhaps the most complete in Europe.

The austere façade of the building gives no hint of the gay charm of the interior, where marble of various colours has been freely used. There is a wide enclosed space between the piazza and the large hall that helps to keep the warm air from escaping. Passing through this one arrives at the large hall, 98 ft. square, where are the booking, wagons-lits, C.I.T., &c. offices. From here, through large glass doors of the latest design, made at Milan, and designed for easy opening and shutting, access is had to the restaurants and waiting rooms. A wide hall, with a ceiling of sheets of



The large ticket hall adjoining the approach hall to the platforms

general admiration when the scaffoldings were removed and the station formally opened, on October 29 last, by the King of Italy. It had been feared that an entirely modern building would be in violent contrast with the Church of Santa Maria Novella, which faces the entrance, but the deep red brown colour of the stone, the same Pietra forte Fiorentina of which the church is built, the proportions of the new station, and the width of the piazza have all helped to make harmony between old and new. On page 727 of our issue of April 27, 1934, we illustrated the design placed first in the competition for the new station, as well as those placed second to fifth; and in the same issue are made our editorial comments on the designs.

The six architects responsible for the winning design were all young Tuscans: Michelucci, Baroni, Gamberini, Berardi, Lusunna, and Guarnieri. They must be congratulated on having succeeded in a very difficult task, for while the new station was being built, the old one on the same site was still in use. The latter, which was built

copper, and a floor of red Siena and cream-coloured Carrara marble, is crossed to reach the platforms. Here the walls are all faced with travertine, and large columns of yellow Botticino marble support the roof over the platforms; the railway lines are open to the sky. These long slanting roofs are entirely covered with a mosaic of tiny, white-grey, terra-cotta tiles placed as mosaics. These have been found to be the easiest to clean. Subways paved with granite and walled with straw-coloured Vicenza marble connect the platforms.

Indirect lighting has been used throughout the building. On the platforms the light units are in long lines and screened by lengths of heavy, newly-treated glass. This glass has three different densities: one for special occasions, one for ordinary use, and the third for use after midnight.

According to the recent Italian law by which every public building in construction must employ artists as well as architects, a number of works of art decorate the new station.

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NEW C.P.R. STREAMLINED 4-4-4 LOCOMOTIVES

The "Jubilee" class for hauling fast trains of lightweight steel passenger stock



THE first of the new streamlined express locomotives which, as announced on page 844 of our issue of November 15, 1935, are being built at the Montreal locomotive works for the Canadian Pacific Railway, was recently completed and handed over to the railway company. This engine, numbered 3000, is illustrated above; it has the 4-4-4 wheel arrangement and is capable of a speed of 110 m.p.h. Streamlining and an increased ratio of power to weight and fuel consumption constitute the outstanding characteristics of the new class, the principal features of which were worked out by Canadian Pacific engineers under the supervision of Mr. H. B. Bowen, Chief of Motive Power and Rolling Stock.

The boilers, of nickel steel, are designed for a pressure

of 300 lb. per sq. in., and the equipment of the engines includes superheaters, feed water heaters, mechanical stokers, roller bearings, and tandem connecting rods; also the special cast steel wheel centres for the coupled wheels as used on certain railways in America. The engines are to be known as the "Jubilee" class in honour of the fiftieth anniversary of trans-continental railway travel.

Intended for hauling lightweight steel passenger cars, the engines have cylinders 16½ in. by 28 in. and coupled wheels 6 ft. 8 in. diameter. The weight of the engine is 111 (British) tons, of which 54 tons are available for adhesion. The tender, which has a capacity of 12 tons of coal, weighs 80 tons, making a total for engine and tender in working order of 191 tons.

Modernisation of the Clacton and Walton Branches, L.N.E.R.

The directors of the L.N.E.R. have approved a scheme, to be carried out under the Government Assisted loan, for the modernisation of the Colchester to Clacton and Walton-on-Naze branches, where recently there has been a remarkable increase, and is a prospective further increase, in traffic.

At Colchester new up and down main lines are to be laid in order to obviate the speed restriction of 40 m.p.h. at present in force over the curves on the existing main lines. This will involve a straightening of the main platforms, and the opportunity is being taken to extend them so as to enable stopping trains to be dealt with in the lengthened dock platform on the up

side, and to avoid delays to express trains using the main lines the existing main lines will become relief lines. A new loop line and siding are also to be provided in the up direction to enable slow passenger trains, and freight and livestock trains, to be dealt with without interference with main-line traffic. Additional carriage sidings and new goods sidings will also be laid. One new subway is to be constructed in the station itself, and another is to be built to take the place of the existing footpath crossing the line at the London end of the station. A re-arrangement of the station buildings will, moreover, be carried out, and altogether a virtually new and

up-to-date station at Colchester will result.

The line between Thorpe-le-Soken and Clacton is to be doubled. New carriage sidings are to be laid down at Clacton and at Thorpe, where the platforms are to be extended and a new engine dock constructed. At Frinton-on-Sea a new platform is to be built on the down side and a new crossing loop added. A new waiting room with improved lavatory accommodation, and an extension to the platform awning are also to be provided. At Walton-on-Naze, additional carriage sidings are to be laid and an awning is to be erected over the platform.

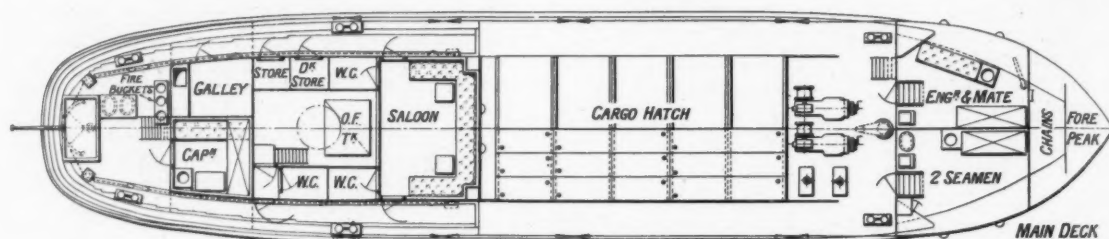
ACCELERATING THE ARRAN MAIL SERVICE



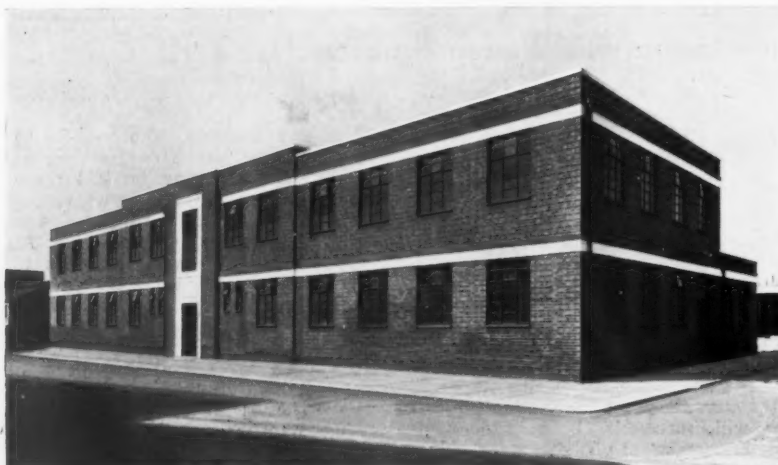
TO meet the requirements of the Post Office authorities for improving the mail service to outlying parts of Arran, the Caledonian Steam Packet Co. Ltd., of Gourock (an associate of the L.M.S.R.), recently took delivery from William Denny & Bros. Ltd., of Dumbarton, of a new diesel-engined vessel, called the *Arran Mail*, with a service speed of about 10 knots. On the new schedule the arrival at Brodick has been arranged as shortly after 8 a.m., so that it will be possible for letters to be delivered, answered, and replies despatched from the island by the afternoon steamer to Ardrossan.

Although built primarily for the special transport of mails, accommodation is provided for 10 passengers, and facilities are also available for the carriage of general cargo and motorcars. The vessel is of the coaster type, with

straight stem and cruiser stern, and engines situated aft. With a length of 94 ft., breadth of 20 ft., and a depth of 9 ft. 6 in., she carries a deadweight of 60 tons on a draught of 6 ft. 9 in. There is a hold forward having one large hatchway, served by a 2½-ton steel derrick carried on the foremast. In the after casing is a saloon for 10 passengers, together with captain's cabin, galley, and the usual lavatory and store room. The engineer, mate, and two seamen are accommodated in a sunk forecabin. The vessel is fitted throughout with electric light, and life-saving and fire-fighting appliances have been provided to the full requirements of the Board of Trade. The main propelling machinery consists of two sets of six-cylinder Gleniffer high-speed diesel engines, fitted with a three-to-one reduction gear.



General arrangement of the "Arran Mail"



The New S.G.E. Headquarters at Wembley

New premises of the Siemens and General Electric Railway Signal Co. Ltd. on the G.E.C. Estate at East Lane, Wembley, where from August 10 the head office of the company will be situated (Tel. ARNold 4321; telegrams and cables Ralsigko, Wembley). The building houses, the sales and engineering departments, as well as stores, experimental section, and demonstration room. The registered office of the company remains at Caxton House, Westminster, S.W.1, as heretofore

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RAILWAY NEWS SECTION

PERSONAL

NEW G.W.R. SUPERINTENDENT OF THE LINE

The directors of the Great Western Railway, at their meeting on July 31, appointed Mr. F. R. Potter, Principal Assistant to the Superintendent of the

Superintendent, and in 1922 Assistant Superintendent of the Line. On January 1, 1933, he succeeded Mr. R. H. Nicholls as Superintendent of the Line, the position from which he now retires. He was gazetted Major in the Engineer and Railway Staff Corps in August, 1925. Mr. L. Wilkinson,

way world will learn with regret the reason that has caused him to seek retirement when it was expected he would continue to occupy the office which he has just vacated for several years to come, and join with us in wishing him a speedy recovery and a long and happy retirement.



Mr. H. L. Wilkinson,
Superintendent of the Line, Great Western
Railway, 1933-36



Mr. F. R. Potter,
Appointed Superintendent of the Line, Great
Western Railway

Line, to be Superintendent of the Line in succession to Mr. H. L. Wilkinson who has retired owing to ill health.

Mr. Wilkinson joined the service of the company in the District Goods Manager's office at Bristol in 1890. Two years later he was transferred to the Divisional Superintendent's office in that city, and in 1896 he was transferred to the London Division. Here he gained an extensive all-round experience, including relief work at stations, and was for three years Assistant Stationmaster at Paddington. In 1910 he was appointed Chief Clerk to the Cardiff Divisional Superintendent, returning the following year to Paddington as Outdoor Assistant to the Divisional Superintendent. In 1917 he was appointed London Divisional

his father, was Chief Goods Manager of the Great Western Railway from 1896 to 1904, and to obviate confusion with the then General Manager, Sir Joseph Wilkinson, took the name of Maiden while in office. During Mr. Wilkinson's superintendency of the line the reputation of the Great Western has lost none of its lustre. His 3½ years of office have witnessed many further train accelerations both for passenger and goods services, the centenary celebrations, the inauguration of the Bristolian, and new trains for the accelerated Cornish Riviera express. The admirable arrangements for the funeral trains from Paddington on the death of the late King were under his personal supervision. Mr. Wilkinson's many friends in the rail-

Mr. Frank Rowe Potter, who, as announced earlier in these columns, has been appointed Superintendent of the Line, Great Western Railway, is the eldest son of the late Mr. Frank Potter, who was General Manager from 1912 to 1919. He entered the company's service on January 1, 1895, as booking clerk at West Drayton and Yiewsley station, and was transferred in May, 1897, to the London Divisional Superintendent's office, where he was employed in the train section until 1900, when to gain further station experience he went to Slough as second goods clerk. After a short period he returned to the Divisional Superintendent's office at Paddington, and remained on the staff of that office until 1907, the last four years as a relief clerk. In

April, 1907, he was transferred to the staff of the Superintendent of the Line as passenger train runner, and in July, 1911, was appointed Assistant Divisional Superintendent at Plymouth. In May, 1913, he was transferred to a similar position in the London Division. On the inauguration of the Westbury Division in 1915, Mr. Potter was appointed its first Divisional Superintendent. In September, 1917, he

pointed to a position in the Traffic Department of the Algeciras-Bobadilla Railway, Spain. Promotion came quickly, and he rapidly passed through the grades of inspector, chief inspector and assistant traffic manager to traffic manager, occupying this latter post from February, 1903, to February, 1912. In March, 1912, Mr. MacRae joined the Central Argentine Railway as Assistant Traffic Manager, holding

appointed General Manager of the United Railways of Havana in 1926, and relinquished this position in 1929 on being appointed Assistant General Manager of the Buenos Ayres Great Southern Railway. Two years later he accepted the general managership of the Cordoba Central Railway.

Mr. Gerald Leedam, has been appointed Secretary and Manager to



Mr. Donald M. MacRae, O.B.E.,

Appointed General Manager, Central Argentine Railway



Mr. G. Leedam,

Appointed Secretary and Manager to the Cheshire Lines Committee

became Divisional Superintendent, Plymouth, but returned to Paddington in January, 1922, as Divisional Superintendent. In October, 1924, however, Mr. Potter was appointed Operating Assistant to the Superintendent of the Line and in May, 1931, became General Assistant. It was in January, 1933, that he was appointed Principal Assistant, the position from which he is now promoted to be Superintendent of the Line.

Mr. Donald M. MacRae, O.B.E., who, as announced in our issue of July 31, has been appointed General Manager of the Central Argentine Railway, has been General Manager of the Cordoba Central Railway since February 1, 1931. He was born in Fifeshire, and received his preliminary training with the Caledonian Railway, which he joined in June, 1893. He occupied various positions with that company until January, 1900, when he was ap-

pointed to a position in the Traffic Department of the Algeciras-Bobadilla Railway, Spain. Promotion came quickly, and he rapidly passed through the grades of inspector, chief inspector and assistant traffic manager to traffic manager, occupying this latter post from February, 1903, to February, 1912. In March, 1912, Mr. MacRae joined the Central Argentine Railway as Assistant Traffic Manager, holding this position until January, 1915, when he temporarily relinquished it to proceed to England in order to join the Army. He enlisted in the Honourable Artillery Company and in May, 1915, was gazetted to a commission in the Railway Transport Division of the Royal Engineers. In March, 1917, he was appointed Assistant Director of Transport with headquarters at Boulogne-sur-Mer, a position he held until the end of the war. In 1918 he was promoted to Lieut.-Colonel, mentioned in despatches, and awarded the O.B.E. He returned to Argentina in 1919, and resumed his duties as Assistant Traffic Manager of the Central Argentine Railway. In 1922 he became Assistant to the General Manager and was placed in charge of the newly-created Labour Department. In June, 1923, Mr. MacRae resigned from the railway service to take over the management of Leach's Argentine Estates in the Province of Jujuj. He was

the Cheshire Lines Committee; he has been Acting Manager since the end of 1932. He joined the service of the Great Central Railway in 1907 as a probationer clerk, was subsequently transferred to the General Manager's office, and passed the higher grade examination instituted by Sir Sam Fay in 1909. After four years' experience in various departments, Mr. Leedam returned to the General Manager's office at Marylebone, and in 1914 was appointed Assistant Goods Agent at Hull. Upon the outbreak of war he joined the H.A.C. but afterwards transferred to the Railway Transport Establishment, R.E., and was gazetted Deputy Director with the rank of Major in 1917. Leaving the Rhine Army in October, 1919, Mr. Leedam was appointed Assistant Traffic Manager, Grimsby, G.C.R., but in 1923 he became Assistant to the District Goods Manager, Hull, L.N.E.R., upon the amalgamation. In

1924 he was appointed Assistant District Goods and Dock Manager, West Hartlepool, which position he held until promoted to be District Goods Manager, Liverpool, in October, 1927. It was in December, 1932, that Mr. Leedam was appointed Acting Manager to the Cheshire Lines Committee.

Mr. H. E. T. Vogel, Locomotive Superintendent of the Leopoldina Railway, is in this country on leave, and will return to Brazil in the middle of September.

Mr. C. W. Bayne, General Manager of the Leopoldina Railway, left Rio on July 7 for England on leave.

IRAQ RAILWAYS BOARD OF ADMINISTRATION

Following the ratification of the agreement between Great Britain and Iraq, and the completion of the transfer of the Iraq Railways to the Government of that country, recorded on page 237 of this issue, the Council of Ministers of the Iraq Government has approved the appointment of the following five members to the Board of Administration of those railways, in accordance with Art. 3 of the terms of transfer:—

President:

Sayid Muhammad Amin Zaki, Minister of Economics and Communications.

Members:

Major-General Taha al-Hashimi, Chief of Staff of the Iraq Army.

Sayid Arshad al-Umari, Director-General of Municipalities.

Mr. E. Gascoigne Hogg, C.M.G., Adviser to the Ministry of Finance.

Col. J. C. Ward, C.M.G., D.S.O., General Manager, Iraq Railways.

We regret to record the death on August 4, of M. Fulgence Bienvenue at the age of 85. He was justly known as the "father of the Paris Metro," and his work in connection with that enterprise forms the subject of an editorial note on page 211.

Mr. Frank O'Doherty has been appointed Stationmaster at Westland Row station, Dublin, *vice* Mr. Beglan, transferred to Dun Laoghaire.

Mr. C. F. Gilbert, on return from leave, has been appointed to officiate as Deputy Agent, East Indian Railway, as from June 15.

Lord Bradbury has been elected a Director of the Weymouth & Portland Railway Company in place of Lt.-Col. L. W. G. Butler, whose death we announced in our issue of July 10.

We regret to note the death, on August 3, of Lord Trevethin, former Lord Chief Justice of England, who in his earlier years specialised in railway law and numbered among his clients the former North Eastern and the Great Western Railways. Before he be-

came Lord Chief Justice, he rendered important public service as President of the Railway and Canal Commission.

G.W.R. APPOINTMENTS

The following appointments are announced by the Great Western Railway:—

Mr. G. Cornish, Goods Agent, Bristol, to be District Goods Manager, Liverpool;

Mr. H. Bolton, Chief Clerk, District Goods Manager's office, Bristol, to be Goods Agent, Bristol;

QUESTIONS IN PARLIAMENT

M.P.'s Travelling Facilities

Mr. Attlee, on July 31, asked the Chancellor of the Exchequer whether, in view of the special disabilities imposed upon a large number of members of the House arising from the long distance between their constituencies and Westminster and the need for frequent night journeys by rail, the Government would be willing to extend the existing travelling facilities for members by the provision of free first class sleeping berths between London and their constituencies.

Mr. W. S. Morrison (Financial Secretary).—The Chancellor of the Exchequer has recently received representations from a number of members of all parties whose constituencies are distant from London urging that the facilities asked for in the present question should be granted. He thinks that the proposal is a reasonable one, and the Government is prepared to accept it. The new arrangement will come into operation on the reassembly of the House after the summer recess.

Electrification in South Lancashire

Mr. Chorlton asked the Minister of Transport whether he was aware of the conditions laid down by the railway companies before they would carry out the electrification of South Lancashire railways; and if he would endeavour to bring about the federation of the various transport systems to enable this important improvement to be carried out.

Mr. Hore-Belisha.—I have followed with interest the efforts being made in the direction of co-ordination of transport facilities in this area, and have already expressed my views in a letter sent recently to the Town Clerk of Manchester.

Level Crossings Accidents

Sir R. Gower asked the Minister of Transport how many accidents had happened on level crossings during each of the past two years; in how many cases had the railway companies been required to erect bridges to replace level crossings; and how many bridges had been erected at level crossings as schemes of road improvements carried out by highway authorities in each of such years.

Mr. Hore-Belisha.—The total number

Mr. A. T. Mayo, Goods Agent, Weymouth, to be Chief Clerk, District Goods Manager's office, Bristol;

Mr. E. Greenway, Divisional Locomotive Superintendent's office, Cardiff, to be Chief Clerk, Divisional Locomotive Superintendent's office, Old Oak Common, London.

Mr. H. Hills, District Engineer, Newcastle-upon-Tyne, L.N.E.R., has recently been elected a full Member of the Institution of Civil Engineers.

of accidents involving the movement of trains at public road level crossings was 153 in 1934 and 134 in 1935. As regards the second part of the question, no such requirement has been made. As regards the last part of the question, four bridges have been erected during the past two years at railway crossings. In addition, four other crossings, although not closed, can be avoided by through traffic by the use of bridges constructed on bypass roads. Grants have also been made during the two years in respect of four other schemes which when completed will provide for bridges at railway crossings.

Railway Station Accidents

Mr. Short asked the Minister of Transport how many persons were killed or injured respectively during 1935 through the opening and closing of railway carriage doors; and whether the figures showed an increase on previous years.

Mr. Hore-Belisha.—The figures for 1935 were: Killed, nil; injured, 2,231. Average figures, 1930-34: Killed, nil; injured, 1,673.

Mr. Short also asked the Minister of Transport how many persons were killed or injured, respectively, during 1935, on attempting to enter or alight from railway trains when in motion, and whether the figures indicated an increase over previous years.

Mr. Hore-Belisha.—The figures for 1935 were: 14 killed, 1,485 injured. They show a decrease of three killed and an increase of nine injured as compared with the average for the previous five years. A certain number of these accidents occurred in connection with stationary trains.

Parliamentary Notes

The Royal Assent

The Lords Commissioners granted the Royal Assent to the following in the House of Lords on July 31:—Great Western Railway (Additional Powers) Act, 1936; London & North Eastern Railway (London Transport) Act, 1936; London & North Eastern Railway (General Powers) Act, 1936; London Passenger Transport Board Act, 1936; Manchester Ship Canal Act, 1936.

New Electric Tunnel Railway at Ramsgate

This line, opened on Friday last, uses part of the derelict L.C. & D.R. Ramsgate Harbour line

Ten years ago the Southern Railway completed a reorganisation of the lines in the Isle of Thanet which it inherited from the London, Chatham & Dover Railway, and the South Eastern Railway. As shown on the accompanying key map, which we reproduce from our issue of July 2, 1926, the new arrangements brought into use on that date involved a new line from a point near the old Ramsgate Town station of the S.E.R. to another point south of Broadstairs on the L.C. & D.R. line. These works left derelict the steeply-graded tunnel approach to Ramsgate Harbour station and resulted in the two Southern Railway stations serving Ramsgate being situated at the back of the town.

For some years past the site of Ramsgate Harbour station has been used as an amusement park, and, except for housing lions in the tunnel mouth, the old tunnel has remained derelict. Now the use of it has been taken over by Warren & Company, the proprietors of the amusement park, as part of a scheme for linking the front at Ramsgate with Dumpton Park station, Southern Railway. It was decided to instal a 2-ft. gauge electric railway from the tunnel mouth at Ramsgate Harbour to a 10-acre plot of ground in Hereson Road, near Dumpton Park station. No light railway order or other powers were involved, as the line is entirely on ground owned by the Tunnel Railway Co. Ltd. of Ramsgate (the owner of the line), or in part of the derelict railway tunnel rented from the Southern Railway. Actually, about 300 yd. are in the old tunnel, and about 700 yd. in small new tunnels, of 9-ft. headroom above rail level, which were built by the Holborn Construction Co. Ltd. for the owners.

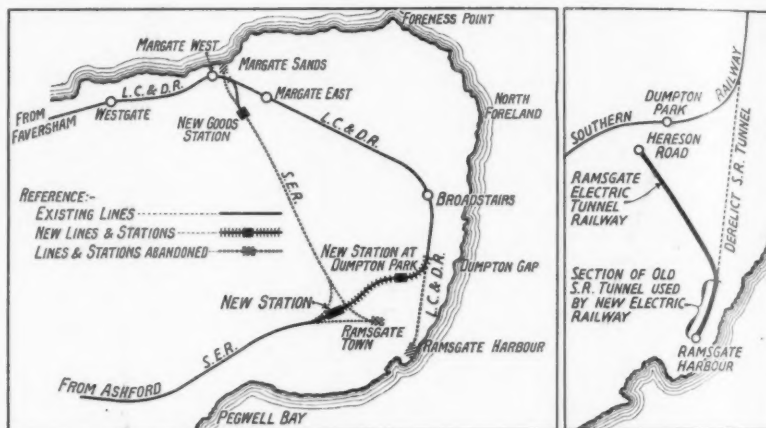
Construction was carried out very rapidly, for work was not begun until April 29, and the line was formally opened for public traffic on Friday afternoon last, July 31, by Mr. E. C. Cox, Traffic Manager, Southern Railway. We understand that over the holiday week-end the railway proved exceedingly popular, and some 20,000 passengers were carried up to the close of traffic on Monday night.

The rolling stock, supplied by the English Electric Co. Ltd., was built as expeditiously as the railway itself, the order for two four-coach trains of bogie stock not being placed until the end of April. Each train has a motor bogie at front and rear, carrying the electrical equipment independently of the coach body; one train has additional driving compartments enabling it to be worked as two two-coach trains, each with one motor bogie. Current collection is by means of tramway-type booms from an overhead

wire. Each motor bogie carries one 30-h.p. 400-V. d.c. axle-slung motor, and the diameter of the driving wheels is 2 ft. 9 in. Carrying wheels are 1 ft. 2 in. dia. The control equipment is of the trolleybus type, with master controller in each driving compartment. Westinghouse brakes are fitted.

The four-coach trains, which have all-welded underframes and bogies, are

99 ft. 6 in. long overall, and 7 ft. 6 in. high. They weigh 23 tons each, and each seats 108 passengers (30 in the trailers and 24 in the motor coaches). Cars are of the open-sided toast rack type, with roofs. One train is painted bright yellow, with blue lines; the other is bright red, with yellow lines. The maximum speed in service is 20 m.p.h. Lighting is at 200 V., supplemented by emergency 6-V. battery equipment. Current for the railway is supplied by an English Electric 100 kW. motor-generator set fed from the town a.c. mains. The total length of the line is about $\frac{1}{2}$ mile.



Left: Sketch plan of the Southern Railway Thanet lines rearrangement of 1926. Right: New Ramsgate electric tunnel railway, which uses part of the tunnel left derelict by the 1926 scheme

London Transport Extensions

Modernisation of the Central London Railway

Orders to begin work at once on the £40,000,000 five-year development scheme were issued on Wednesday by the London Passenger Transport Board following the Act authorising the new works receiving the Royal Assent on July 31.

An agreement has been reached concerning the form of electrification to be adopted on the Central London Line, and on the important extensions east and west. Fourth-rail insulated return will be adopted, as this is standard on the remainder of the board's lines; at present the Central London Line uses the third rail system with earthed return.

Tunnels on this line are in places badly aligned, and, whereas only one inch divergence from true is now allowed in boring, on the Central London Line the boring is in places as much as 8 in. out. Powers are contained in the London Transport Act, 1936, to realign the tunnels, and on an experimental section between Bond Street and Oxford Circus segments are being taken out and data are being obtained on which the contracts for the work will be based.

When this has been completed, it will be possible, by a modification of

the height and section of the conductor rail to introduce the fourth rail through-out, thereby enabling standard stock to be run. This work, together with that of lengthening the platforms to enable longer trains to be run, will be carried out without interruption to traffic, and working time will thus be restricted to about four hours each night; all materials must be conveyed to the site by ballast trains during this period. Work will take place at several points at one time, and is expected to take two years to complete.

FASTER L.N.E.R. FREIGHT TRAINS IN THE NORTH.—The L.N.E.R. has accelerated a number of important goods trains during the past six months. The speed of No. 1 express goods trains is 45 m.p.h. and during the past six months their booked weekly mileage in the North-East of England and Scotland has been extended from 16,841 to 21,882. No. 2 express goods trains run at a speed of 33 m.p.h. and their booked weekly mileage in the same districts has risen from 32,740 at the beginning of the year to 35,151.

MINISTRY OF TRANSPORT ACCIDENT REPORT

Near Lea Road, Preston, L.M.S.R.,
March 11, 1936

Ganger A. Reeves and relayers J. L. Topping, J. Thompson and T. Rossall were run down and fatally injured, and relayer T. B. Woods was injured by the 8.28 a.m. express from Blackpool North to Liverpool Exchange, travelling on the up slow line, opposite Ashton Intermediate cabin. There are four tracks at this point, up and down fast and up and down slow. The 8.25 a.m. Fylde Coast Express, Blackpool Central to Euston via Preston, was running on the up fast slightly in advance—the length of an engine and coach—of the other train and its steam was obscuring it. The weather was fine and clear, with a slight breeze from the north-east. Mr. J. L. M. Moore inquired into the accident.

A mile of the up slow track was to be relaid between the $1\frac{1}{2}$ and $2\frac{1}{2}$ mile posts from Preston, and two gangs, some 64 men in all, merged into one from the start, including two gangers, J. Hindle and Alfred Reeves, started the preparatory work the day before the accident. There appears to have been no definite understanding as to who was in charge; Hindle was senior in service, but Reeves had been a ganger somewhat longer. Fifteen men under a sub-ganger and lookout man were laying out the rails, the remainder—the main gang—were opening out the ballast, with a lookout man at each end, divided in sets of four, each set responsible for a rail length. When one was completed the men started on another at the Blackpool end of the gang. They were spread over a distance of 495 ft., and the leading men were 106 yd. west of Ashton cabin by 9.0 a.m. when the accident occurred.

Relayer W. Armistead was lookout man, and standing in the down fast track some 30 yd. from the leading man. He could see smoke and steam from an up train for over a mile, but owing to a curve and slight cutting could not determine on which line it was travelling until it was within half-a-mile of him. That gave him time to warn the men, as there was a 15 m.p.h. speed restriction where they were working and drivers had to reduce speed to observe it by the time they reached the "C" board, 143 yd. from the leading men at the time. Armistead would blow his horn when he saw a train rounding the bend on the up slow, but did not give warning for up fast trains unless men were crossing that line, when he supplemented the horn by a shout or a sign indicating the line concerned. Shortly before 9.0 a.m. he noticed that Ashton up fast and up slow homes were lowered, saw smoke in the distance, and later the 8.25 a.m. train rounding the bend on the up fast. As one or two men were crossing it he warned them by the horn and a shout; after seeing them safe he turned and watched for

the up slow train. He did not see it, owing to steam blowing across from the up fast train, until the engine of the latter was passing him and then endeavoured to warn the men with the horn and his shouting, but owing to the noise he was not heard. Eighteen men were in the four-foot, the rest were on sleeper ends. The majority noticed the train or heard the shouts of other men and jumped aside, but five were struck.

It is probable that all would have been able to move clear had the train been travelling at the required 15 m.p.h. G. H. Critchlow, the driver, admits he failed to notice the warning board half a mile away in the six-foot space on his side, owing to smoke from the other train. He passed the "C" board probably at about 50 or 60 m.p.h. The regulation notice appeared in the Fortnightly Engineering Supplement for March 7 to 20, and Critchlow admits receiving and signing for it on March 6. He remembers seeing men standing aside, nearer Preston, on the previous day, but the boards were not in position then, and he was not required to reduce speed.

Assistant Inspecting Officer's Conclusions

The primary responsibility for this accident rests with Armistead. He failed to call the men off the track when, owing to the smoke and steam, he could no longer protect them. Special stress is laid on this duty in the two-yearly examination of lookout men. Armistead, who has a long and good record, passed the last test in September, 1934 satisfactorily, but Mr. Moore thought he did not now possess the quickness of mind essential to this work. He failed to grasp the possibilities of the situation and his suitability is a matter for serious consideration.

A large measure of responsibility, Mr. Moore considers, rests on Driver Critchlow, who failed to obey the speed restriction. Though primarily intended for the safety of trains, speed restrictions serve as an additional safeguard to men on the track and are to a certain extent so relied on. Critchlow had no difficulty in locating his position in spite of steam and smoke, and should have reduced speed approaching the stretch of line to which the warning notice applied. He also admittedly failed to sound the engine whistle in accordance with Rule 127 (vi). Mr. Moore holds him seriously to blame for his omissions.

Owing to delay in transit the "warning," "C," and "T" boards were not in position till noon the day before; while this was in time for safety of the traffic, departure from the usual practice of placing them before work begins is to be regretted, and is regarded by Mr. Moore as a contributory cause of the accident, though it does not excuse Critchlow.

Remarks and Recommendations

This accident resembles that at Watford on November 9, 1932, when five men were killed in very similar circumstances. During the past three years 135 men have lost their lives and 100 been injured at work on the permanent way through being struck by engines or trains; only 12 of these casualties were due to failure of lookout men. In spite of numerous other suggestions Mr. Moore remains of opinion that a lookout man is the most reliable protection, but it is essential that only suitable men be utilised, of sound judgment and capable of quick decisions and actions in an emergency. Greater importance should be attached to the selection and registration of lookout men. To ensure that only suitable men are chosen, duly impressed with the responsibility of their duties, Mr. Moore recommends that every man be interviewed by the District Engineer or his assistant before being registered for the first time, and, together with existing lookout men, be examined at least once a year by a suitable inspector.

The method of conveying the warning to the men at work is another matter demanding careful consideration, in view of the growing tendency to concentrate and employ larger gangs both for maintenance and relaying. To establish the relative value of horn and whistle Mr. Moore carried out tests with 12 men shovel packing stone ballast. Their positions and manner of working, in rhythm or otherwise, affected the results considerably, but the following facts emerged:—

(i) The whistle is considerably more penetrating than the horn.

(ii) The man nearest the lookout can be relied on to hear the horn at 30 yd. and the whistle at 40 yd.

(iii) A man in the middle of the gang cannot hear the whistle with any degree of certainty at a distance of more than 20 yd. and the horn at considerably less.

It is evident that at the present time men frequently have to rely on each other to pass on the warning, which is dangerous and should not be necessary. Either a more powerful means of giving warning should be provided for the lookout men or definite instructions be issued that in certain circumstances, having regard to the number of men and character of their work, additional lookout men must be placed alongside the gang, to ensure the warning reaching every man concerned. Investigation on these lines is recommended.

Finally Mr. Moore considers that work of this importance should not be left in charge of a ganger, especially with risk of doubts of the relative superiority of more than one. An inspector should be present throughout and be responsible for all arrangements, including the protection of the men, which calls for considerable foresight and judgment.

NOTES AND NEWS

Air-Conditioning in Canada.—Air-conditioning is now installed in most of the Canadian Pacific Railway main line vehicles, including sleeping and observation cars, and on the Canadian National system it is also being introduced.

"Train Ferries" Prize Paper.—The North-East Coast Institution of Engineers and Shipbuilders has awarded a prize to Mr. P. Denham Christie for a paper entitled "Train Ferries," read before the graduate section of the institution.

The Matterhorn Ropeway.—Following a blessing by the Bishop of Aosta, the first section of the Matterhorn ropeway was opened on August 2. It extends from Cervinia (Breuil) to the Maison plain; the latter is about 8,700 ft. high, and the ropeway has a rise of about 1,700 ft.

N.U.R. £500 Contribution to Spain.—The executive of the N.U.R. decided at a special meeting in London on July 31, to contribute £500 to the fund the National Council of Labour is raising to relieve the suffering, particularly among women and children, caused by recent events in Spain.

Maidstone & District Motor Services Limited.—At a meeting to be held on August 11, shareholders will be asked to sanction a bonus distribution of one ordinary share for every two held. £121,896 will be transferred from depreciation reserve to the general reserve fund and £250,000 of the latter capitalised.

The Future of Immingham Dock.—For some little time now persistent rumours have been circulating to the effect that Immingham dock, the property of the L.N.E.R., is to be taken over by the Government. In the interest of the trade of the port, the L.N.E.R. wishes to make it known that these rumours are entirely without foundation and that no change is contemplated in the ownership of Immingham dock.

Canadian Pacific Earnings.—Gross earnings of the Canadian Pacific Railway for the month of June, 1936, amounted to \$10,958,000, an increase of \$768,000 in comparison with June, 1935. In the working expenses of \$9,782,000 there was an increase of \$996,000, leaving net earnings \$228,000 higher, at \$1,176,000. Aggregate gross earnings for the first six months of 1936 were \$62,045,000, an increase of \$5,516,000, and the net earnings of \$6,791,000 were higher by \$729,000.

Canadian National Railways.—For the month of June, 1936, gross earnings of the Canadian National Railways amounted to \$14,739,765, an increase of \$1,027,510 in comparison with June, 1935. Operating expenses (\$14,730,322) advanced by \$522,383 to leave net earnings of \$9,442, which were \$505,126

higher than for June, 1935. Aggregate gross earnings from January 1 to June 30, 1936, were \$85,461,428, an improvement of \$5,329,633, and the net earnings for the six months were \$307,503 higher at \$2,475,040.

Miniature Railway Opened at Clacton.—On July 31, a one-mile miniature railway at Jaywick, near Clacton, was officially opened by Mr. C. H. Newton, Divisional General Manager (Southern Area), L.N.E.R. Mr. F. C. Stedman is responsible for the enterprise, which can haul 24 passengers with its miniature steam locomotive.

Abyssinian Railway Agreement.—According to a Reuters message from Rome, an agreement has been concluded between the Italian Colonial Administration and the French company running the railway from Djibouti to Addis Ababa, for regulating tariffs, exchange questions, and method of payment. It is understood to be a temporary arrangement, lasting from August 1 until the end of the present year, when a further convention will be drawn up.

Latvian Railway Electrification.—It is reported from Riga that on August 1, the Latvian Minister of Finance signed a contract with the Svenska Entreprenad for the construction of a large hydro-electric plant on the river Dvina at a cost of about £2,000,000. Current supply is to commence in November, 1939, and the plant is to be completed by June, 1940. Apart from ordinary commercial and industrial needs, Latvian railway electrification is envisaged.

L.M.S.R. 1937 Large Building Programme.—Details will be found on our Contracts and Tenders page this week, of the L.M.S.R. building programme for 1937, involving an expenditure on locomotives, coaches, and wagons of three and a quarter million pounds. New locomotives totalling 105 are to be built, together with 210 boilers, 751 coaches, and 12,105 wagons. Orders placed during the past week with eight British firms for a total of 2,195 wagons as part of this programme, are also announced on our Contracts and Tenders page this week.

Spanish Local Lines in 1935.—The revenue of the Cantabrico Railway during 1935 amounted to 3,865,230 pesetas and the operating costs, including pensions allowances, to 2,948,492 pesetas. The net revenue of 916,738 pesetas was a slight increase on the 1934 figure. On the Cortes-Borja Railway the receipts totalled 162,403 pesetas and the expenditure 160,254 pesetas. The short electrified La Loma Railway registered an operating deficit of 92,087 pesetas, the expenditure amounting to 479,240 pesetas and the receipts to 387,153 pesetas. The operation of this line was suspended in

May of this year, but subsequently a service was re-opened under the direction of the traffic manager of the State railways, pending a decision regarding the affairs of the owning company.

Derelict Cork Railway Terminus Sold.—The Albert Street terminus in Cork of the old Cork, Blackrock, & Passage Railway, became derelict on the abandonment of that railway on September 12, 1932. The terminus was sold by auction in Cork on July 29, for £4,450, to Metal Products Limited; it will be used as a factory.

Railway Coronation Arrangements.—An Empire train to tour Great Britain during the coronation year, in conjunction with shopping weeks and film propaganda at the towns visited throughout the country, has been proposed by Sir Richard Linton, ex-Agent General of Victoria in London. At a meeting between the Department of Overseas Trade and Imperial representatives, it was agreed to ask the High Commissioners to nominate members for a committee to examine the idea more closely. Arrangements are already being made by the companies themselves for coronation traffic to London, and among the 130 special trains to be operated by the L.M.S.R. is one from Inverness—a return journey of 1,136 miles.

Second Congress of the International Association for Testing Materials.—The next congress of the International Association for Testing Materials will be held in London from April 19-24, 1937. The executive committee of the Congress Organising Committee consists of Sir Frank Smith (Chairman), Sir William Larke (Vice-Chairman), Sir Harold Carpenter, Sir Alexander Gibb, Dr. H. J. Gough, Sir Nigel Gresley, Sir Clement Hindley, and Mr. K. Headlam-Morley (Honorary Secretary). Sir William Bragg will be President of the London Congress. The subjects selected for discussion are divided into four groups dealing respectively with Metals, Inorganic Materials, Organic Materials and Subjects of General Importance.

L.P.T.B. Rating Scheme.—The Railway Assessment Authority has given notice that, in pursuance of Section 15 of the Railways (Valuation for Rating) Act, 1930, as applied with adaptations and modifications to the London Passenger Transport Board by the London Passenger Transport (Valuation for Rating) Scheme, 1935, and the London Passenger Transport (Valuation for Rating) Order, 1935, it has prepared a scheme for determining: (a) the principles in accordance with which the net annual value of the transport undertaking as a whole of the London Passenger Transport Board is to be apportioned by the authority between the transport hereditaments occupied by the board; and (b) the basis on which the expenses of the authority are to be apportioned among the councils of the several counties and county boroughs within which the said transport under-

taking is carried on. The scheme may be inspected at the office of the authority, at 32, Queen Anne's Gate, London, S.W.1.

Ratification of Iraq Railway Transfer Agreement.—The agreement between Great Britain and Iraq, outlined on page 946 of THE RAILWAY GAZETTE of May 15 last, for the transfer of the Iraq Railways, signed on March 31, 1936, having been duly ratified, instruments of ratification were exchanged on July 9 in Baghdad, between the accredited representatives of the two High Contracting Parties. In consequence of the completion of the transfer, the personnel of the Railways Administration Board is now announced and will be found on page 233.

Train and Bus Connections at Beaconsfield.—To enable passengers to make train and bus connections comfortably at Beaconsfield station, revised timetables for bus services 373 (Beaconsfield to Knotty Green and Penn) and 398 (Beaconsfield to Coleshill and Amersham) were introduced on

Wednesday last, August 5. Particular attention has been paid to morning and evening business train connections. The Sunday bus service between Beaconsfield and Penn will be increased from 4 to 9 journeys in each direction; and between Beaconsfield and Amersham from 4 to 8 journeys. Connections have been arranged wherever possible with Green Line coaches to and from London; and at Penn with buses to and from High Wycombe.

Road Accidents.—The Ministry of Transport return for the week ended August 1 of persons killed or injured in road accidents is as follows. The figures in brackets are those for the corresponding period of last year:—

	Killed, including deaths resulting from previous accidents		Injured	
England	112	(123)	4,603	(4,698)
Wales	6	(7)	248	(269)
Scotland	12	(8)	412	(444)
	130 (138)		5,263 (5,411)	

The total fatalities for the previous week were 132, compared with 111 for the corresponding period of last year.

British and Irish Traffic Returns

GREAT BRITAIN	Totals for 31st Week			Totals to Date		
	1936	1935	Inc. or Dec.	1936	1935	Inc. or Dec.
L.M.S.R. (6,917 mls.)						
Passenger-train traffic...	1,027,000	968,000	+ 59,000	15,050,000	14,843,000	+ 207,000
Merchandise, &c. ...	441,000	422,000	+ 19,000	14,605,000	13,787,000	+ 818,000
Coal and coke ...	222,000	197,000	+ 25,000	7,456,000	7,089,000	+ 367,000
Goods-train traffic ...	663,000	619,000	+ 44,000	22,061,000	20,876,000	+ 1,185,000
Total receipts ...	1,690,000	1,587,000	+ 103,000	37,111,000	35,719,000	+ 1,392,000
L.N.E.R. (6,332 mls.)						
Passenger-train traffic...	594,000	555,000	+ 39,000	9,686,000	9,598,000	+ 88,000
Merchandise, &c. ...	330,000	321,000	+ 9,000	9,940,000	9,583,000	+ 357,000
Coal and coke ...	215,000	182,000	+ 33,000	7,162,000	6,792,000	+ 370,000
Goods-train traffic ...	545,000	503,000	+ 42,000	17,102,000	16,375,000	+ 727,000
Total receipts ...	1,139,000	1,058,000	+ 81,000	26,788,000	25,973,000	+ 815,000
G.W.R. (3,746½ mls.)						
Passenger-train traffic...	433,000	413,000	+ 20,000	6,245,000	6,209,000	+ 36,000
Merchandise, &c. ...	204,000	192,000	+ 12,000	5,836,000	5,608,000	+ 228,000
Coal and coke ...	100,000	94,000	+ 6,000	3,123,000	3,063,000	+ 60,000
Goods-train traffic ...	304,000	286,000	+ 18,000	8,959,000	8,671,000	+ 288,000
Total receipts ...	737,000	699,000	+ 38,000	15,204,000	14,880,000	+ 324,000
S.R. (2,154 mls.)						
Passenger-train traffic...	534,000	522,000	+ 12,000	9,202,000	9,147,000	+ 55,000
Merchandise, &c. ...	70,000	67,000	+ 3,000	1,912,500	1,895,500	+ 17,000
Coal and coke ...	31,000	29,000	+ 2,000	973,500	913,500	+ 60,000
Goods-train traffic ...	101,000	96,000	+ 5,000	2,886,000	2,809,000	+ 77,000
Total receipts ...	635,000	618,000	+ 17,000	12,088,000	11,956,000	+ 132,000
Liverpool Overhead ...	1,259	1,318	- 59	36,226	36,085	+ 141
(6½ mls.)						
Mersey (4½ mls.) ...	3,939	4,010	- 71	124,455	123,549	+ 906
*London Passenger Transport Board ...	546,830	534,200	+ 12,630	2,787,600	2,732,100	+ 55,500
IRELAND						
Belfast & C.D. pass. (80 mls.)	4,348	4,231	+ 117	77,294	78,565	- 1,271
" " goods	662	592	+ 70	17,192	15,500	+ 1,692
" " total	5,010	4,823	+ 187	94,486	94,065	+ 421
*Great Northern pass. (543 mls.)	17,350	17,600	- 250	306,150	298,350	+ 7,800
" " goods	10,900	11,450	- 550	289,600	279,650	+ 9,950
" " total	28,250	29,050	- 800	595,750	578,000	+ 17,750
*Great Southern pass. (2,067 mls.)	55,424	58,831	- 3,407	1,011,833	1,002,101	+ 9,732
" " goods	42,412	38,214	+ 4,198	1,221,403	1,150,543	+ 70,860
" " total	97,836	97,045	+ 791	2,233,236	2,152,644	+ 80,592

* 5th week.

† 30th week.

August Bank Holiday Bookings.

British and Irish Railways Stocks and Shares

Stocks	Highest 1935	Lowest 1935	Prices	
			Aug. 5, 1936	Rise/ Fall
G.W.R.				
Cons. Ord. ...	55½	44½	50½	-1
5% Con. Prefce. ...	124	108	122	-
5% Red. Pref. (1950) ...	117	106½	111½	-
4% Deb. ...	118½	108	115	+½
4½% Deb. ...	122	110	117½	+1
4½% Deb. ...	129½	118	125	+½
5% Deb. ...	140½	130	136½	-
2½% Deb. ...	82½	68½	76	-
5% Rt. Charge ...	137	128	134½	+1
5% Cons. Guar. ...	136½	120½	133	-
L.M.S.R.				
Ord. ...	25½	16	27	+½
4% Prefce. (1923) ...	58½	43½	78	+3
4% Prefce. ...	87½	73½	90½	+½
5% Red. Pref. (1955) ...	107	97½	108½	+1
4% Deb. ...	110½	99½	107	+½
5% Red. Deb. (1952) ...	119½	111½	116½	-
4% Guar. ...	105½	95½	104½	+½
L.N.E.R.				
5% Pref. Ord. ...	157½	81½	12½	+2
Def. Ord. ...	79½	45½	6	+7½
4% First Prefce. ...	74½	48	73	+4½
4% Second Prefce. ...	31½	16½	28½	+2½
5% Red. Pref. (1955) ...	92½	71	95½	+2
4% First Guar. ...	103½	93	101½	-
4% Second Guar. ...	98½	82½	96	+½
3% Deb. ...	86	75	82	-
4% Deb. ...	109½	98½	106	+½
5% Red. Deb. (1947) ...	118½	106½	111½	-
4½% Sinking Fund Red. Deb. ...	112½	108	109	-
SOUTHERN				
Pref. Ord. ...	87½	69½	93	-
Def. Ord. ...	25½	16½	22½	+1
5% Prefce. ...	124	108½	122	-
5% Red. Pref. (1964) ...	117½	109½	118½	-
5% Guar. Prefce. ...	136½	121½	132½	-
5% Red. Guar. Pref. (1957) ...	121½	112½	119½	-
4% Deb. ...	116½	107	113½	-
5% Deb. ...	138	130½	135½	-
4% Red. Deb. ...	115	106½	111½	-
1962-67				
BELFAST & C.D.				
Ord. ...	9	4	5	-
FORTH BRIDGE				
4% Deb. ...	111½	104½	104½	-
4% Guar. ...	109½	104	104½	-
G. NORTHERN (IRELAND)				
Ord. ...	20	7	15½	-
G. SOUTHERN (IRELAND)				
Ord. ...	57½	14½	59½	-
Prefce. ...	50	25½	58	+2
Guar. ...	88½	51½	90	+5
Deb. ...	86½	70	93	+2
L.P.T.B.				
4½% "A" ...	130	119½	122½	-
5% "A" ...	139½	130	134½	-
4½% "T.F.A." ...	113½	108	109	-
5% "B" ...	131½	122½	128½	-
"C" ...	109½	91	105	-
MERSEY				
Ord. ...	23½	9½	25½	-
4% Perp. Deb. ...	100½	93½	98*	-
3% Perp. Deb. ...	75½	67	74½*	-
3% Perp. Prefce. ...	62	47½	64½	-

* ex dividend

CONTRACTS AND TENDERS

L.M.S.R. £3,250,000 Building Programme for 1937

The L.M.S.R. announces a £3,250,000 programme of locomotive, carriage, and wagon building for 1937 which provides for the construction of 105 locomotives, 210 locomotive boilers, 751 coaches, and 12,105 wagons. The greater part of the new rolling stock will be built in the L.M.S.R. workshops at Crewe, Derby, Wolverton, and elsewhere, but during the past week the following orders have been placed with eight British firms for a total of 2,195 wagons, of which 2,000 are of the 12-ton medium merchandise type:—

Charles Roberts & Co. Ltd., 800, Metropolitan-Cammell Carriage & Wagon Co. Ltd., 650, Hurst Nelson & Co. Ltd., 35 and R. Y. Pickering & Co. Ltd., 200 12-ton medium merchandise wagons; Birmingham Railway Carriage & Wagon Co. Ltd., 150 20-ton hopper ore wagons; Hurst Nelson & Co. Ltd., 25 20-ton hopper grain wagons; P. & W. McLellan Limited, 10 20-ton implement trucks; and G. R. Turner Limited, 10 12-ton glass wagons.

The locomotive programme of 105 new engines will include five more of "The Princess Royal" type, the largest and most powerful express passenger engines on the L.M.S.R. system. These engines will be built at Crewe works. Over a million pounds are to be spent by the L.M.S.R. during the coming year on 751 new passenger carriages; the majority will be of vestibule or corridor types for long-distance travel, and will embody the latest refinements for travel luxury. Seventeen restaurant cars will also be built, thus completing a scheme which the L.M.S.R. has been carrying out progressively in recent years for improving and increasing restaurant facilities on its main-line trains. Including the new £3,250,000 programme now announced, the L.M.S.R. will have spent since its formation in 1923 no less than £66 millions on new rolling stock.

Coaches for South Africa

Following the submission of tenders for the supply of coaches early in June, the South African Railways & Harbours Board has now made final allocations of orders, with the result that a total of 88 main-line coaches is to be constructed by British firms as follows: Metropolitan-Cammell Carriage & Wagon Co. Ltd., 35 second class coaches type E 13; and Birmingham Railway Carriage & Wagon Co. Ltd., 18 first class type C 25, and 35 first and second class composites type D 32.

Craven's Railway Carriage & Wagon Co. Ltd. has received an order from the Bombay, Baroda & Central India Railway Administration for 76 pairs of wagon wheels and axles to be supplied to the inspection of Messrs. Rendel, Palmer & Tritton.

R. & W. Hawthorn, Leslie & Co. Ltd. has received orders from the Karachi Port Trust for one boiler for a 0-6-0 side tank locomotive and four locomotive buffers, to be supplied to the inspection of Messrs. Rendel, Palmer & Tritton.

Locomotives for India

Nasmyth Wilson & Co. Ltd. has received an order from the Bengal North Western Railway for four YB class 4-6-2 superheated passenger type locomotives and tenders for metre gauge service, to be supplied to the inspection of Messrs. Rendel, Palmer & Tritton. This order is a repeat of that for eight engines of the same type ordered by this administration from the same firm, as recorded in our issue of August 10, 1934.

Thompson Bros. (Bilston) Limited has received an order from the Buenos Ayres Great Southern Railway for 14 stainless steel tanks for milk transport.

Diesel Engine Orders

Davey, Paxman & Co. (Colchester) Ltd. has in hand the following engines of the Paxman-Ricardo series for installation in locomotives now being built: twelve 40/44-b.h.p. engines for Huddswell, Clarke & Co. Ltd., Leeds; a 30/33-b.h.p. engine for the Hunslet Engine Co. Ltd., Leeds; seven 60/66-b.h.p., one 50/55-b.h.p., six 40/44-b.h.p., and a batch of special 20/22-b.h.p. engines for F. C. Hibberd & Co. Ltd., London; and a 180-b.h.p. engine for Andrew Barclay Limited for installation in a locomotive to the order of Imperial Chemical Industries Limited.

Diesel Railcars for South America

The Birmingham Railway Carriage & Wagon Co. Ltd. has received orders for a total of 10 articulated diesel railcars each fitted with two Gardner 6LW engines developing 102 b.h.p. at 1,700 r.p.m. for the Buenos Ayres Midland Railway. The cars comprise the following types: four one-class for local services; four two-class for main line services; and two general goods and poultry service railcars. Each railcar will have a Vulcan-Sinclair coupling and a Wilson epicyclic four speed and reverse gearbox. All the cars will have Vacuum brakes, and the four for main line services will have buffet sections, electrical cooking equipment and refrigerators. Excepting the goods railcars, all will have lavatory accommodation.

Yarrow & Co. Ltd., has received an order from the London Passenger Transport Board for 16 Yarrow land boilers, complete with mechanical stokers, for the board's tramway generating power station at Greenwich.

D. Wickham & Co. Ltd. has received a repeat order for one petrol-driven gang trolley for the Central Argentine Railway, and a repeat order for 19

gang trolleys and spares for the Provincial de Santa Fé Railway.

J. Baker & Bossemer Limited has received an order from the Buenos Ayres Western Railway for 50 pairs of wheels and axles.

Wheels, Axles and Tyres for India

Orders for wheels and axles, tyres and other equipment have been placed by the Indian Stores Department, at the prices named, as follows:—

Burn & Co. Ltd., 500 chilled cast iron wheels (Rs. 11,464, c.i.f. Karachi).

Bell's Asbestos & Engineering (India) Limited, 80 axles and tyres (Rs. 75,200, c.i.f. Karachi).

United Steel Cos. (India) Ltd., 500 tyres (Rs. 36,500 c.i.f. Karachi).

Vickers (India) Limited, 300 16-ton B.G. axles (Rs. 38,700, c.i.f. Karachi).

Shaw Wallace & Co., 60 straight axles (Rs. 11,195, c.i.f. Karachi) and 100 straight and crank axles (Rs. 51,383).

Krupp Indian Trading Co. Ltd., 200 wheels and tyres (Rs. 17,700, c.i.f. Karachi), quantity of tyres and crank axles (Rs. 29,520) and quantity of disc wheels, tyres and axles (Rs. 43,515).

Guest, Keen Williams Limited, 347 wheels and tyres (Rs. 48,232, c.i.f. Karachi).

Jessop & Co. Ltd., 132 locomotive tyres (Rs. 19,718).

Suren Piras & Co., 247 locomotive tyres (Rs. 24,537) and quantity of other axles and tyres (Rs. 14,501).

R. Wright & Partners Limited, 12 crank axles (Rs. 23,573).

J. O'Hara Murray & Co. (India) Ltd., 527 carriage and wagon tyres (Rs. 47,834) and 194 locomotive tyres (Rs. 21,442).

William Jacks & Co., 48 motor bogie straight axles (Rs. 15,072) and 15 engine crank axles (Rs. 29,415).

Vickers (India) Limited, 197 locomotive tyres (Rs. 29,965).

Hukam Chand Electric Steel Co. Ltd., 1,402 cast steel axleboxes (Rs. 19,980).

The directors of the Great Western Railway Company have authorised the placing of the following contracts:—

Express Motor & Body Works, Limited, two Morris 30-cwt. chassis and two Morris 1-ton chassis.

R. Pratt Limited, one Fordson Sussex chassis.

Principality Wagon Co. Ltd., two movable rubber-floor bodies for use on road motor vehicles.

R. A. Lister & Co. Ltd., one Lister auto truck.

W. T. Nicholls Limited, reconstruction of Bath Road bridge over the Radstock branch at Brislington.

F. Holcombe & Sons Ltd., erection of a hostel at Cardiff General station for the refreshment room staff.

Cowans Sheldon & Co. Ltd., supply of 22 electric capstans at the Hockley goods depot.

For Swindon Works:

Greenwood & Batley Limited, one spring coiling machine.

S. Russell & Sons Ltd., one cold sawing machine.

B. & S. Massey Limited, one trimming press.

Cowans Sheldon & Co. Ltd., supply and erection of an electrically-driven traverser.

Steam Travelling Cranes Required

The South African Railways & Harbours Administration is calling for tenders (Contract No. 968) for the supply and delivery of one 10-ton and two 20-ton steam travelling jib cranes. Tenders endorsed "Tender No. 968 for Steam Travelling Cranes," should be addressed to the Secretary to the Tender Board, South African Railways Headquarter Offices, Johannesburg, by whom they will be received up to September 21, 1936.

OFFICIAL NOTICES

Crown Agents for the Colonies

COLONIAL GOVERNMENT APPOINTMENTS.

APPLICATIONS from qualified candidates are invited for the following post:—
ASSISTANT ENGINEER required by the Government of Nigeria for the Railway Department for two tours of 12-18 months. Salary £475 a year for two years then £500—£225—£600—£30—£840 a year. Free passages and quarters and liberal leave on full salary. Candidates, aged 23-35, must be student members of the Institution of Civil Engineers and have had experience in bridge and reinforced concrete construction. Apply at once by letter, stating age, whether married or single, and full particulars of qualifications and experience, and mentioning this paper to the Crown Agents for the Colonies, 4, Millbank, London, S.W.1, quoting M/4051.

The Rohilkund and Kumaon Railway Company, Limited

THE Directors are prepared to receive tenders for the supply of:—
TWO LOCOMOTIVE TANK ENGINES
TWO LOCOMOTIVE ENGINES AND TENDERS

as per specifications to be seen at the Company's Offices.

Tenders addressed to the undersigned, and envelope marked "Tender for Locomotives," with name of firm tendering, to be lodged not later than noon on the 31st day of August, 1936.

For the two specifications a fee of £1 will be charged which cannot, under any circumstances, be returned.

The Directors do not bind themselves to accept the lowest or any tender.

By Order of the Board,

W. R. IZAT,
 Secretary.

237, Gresham House,
 Old Broad Street, London, E.C.2.
 5th August, 1936.

Indian State Railways

THE Secretary of State for India in Council will in the near future make one appointment to the Indian Railway Service of Engineers and two appointments to the Transportation (Traffic) and Commercial Departments of the State Railways. Candidates must be male British subjects of non-Asiatic domicile. They must have attained the age of 21 years and must not have attained the age of 25 years on 1st August, 1936.

The appointment in the Indian Railway Service of Engineers is for a Civil Engineer. Candidates must either (1) have obtained one of certain recognised University degrees or other distinctions in Engineering, or (2) have passed sections A and B of the Associate Membership Examination of the Institution of Civil Engineers or an examination securing exemption therefrom, or (3) have passed the Associateship in Engineering of the City and Guild's Institute (Imperial College of Science and Technology, South Kensington), or (4) produce evidence that they are otherwise eligible under the regulations. They must in addition have had two years approved practical experience in engineering.

Candidates for the appointments in the Transportation (Traffic) and Commercial Departments must either

(a) have obtained an Engineering or Science degree of any teaching University in the United Kingdom granted after not less than 3 years' study in that University, or a technical diploma or certificate recognised by the Secretary of State. The degree, diploma or certificate held should include among the subjects taken one or more of the following:—

(1) Applied Mathematics; (2) Physics with Statics and Dynamics; (3) Mechanics (including strength of materials and theory of structures); (4) Prime Movers, or,

(b) have had not less than two years' training, as pupil or apprentice, in the Traffic Department of a British or Colonial Railway,

following a sound general education, which must have included an element of scientific or Engineering study.

Applications from candidates for the above appointments must reach the India Office not later than 29th August, 1936. Printed forms together with information regarding the conditions of appointment may be obtained from the Secretary, Services and General Department, India Office, Whitehall, S.W.1.

India Office.
 August, 1936.

Universal Directory of Railway Officials and Railway Year Book

42nd Annual Edition, 1936 1937

JUST PUBLISHED

Price 20/- net.

This unique publication gives the names of all the principal railway officers throughout the world, together with essential particulars of the systems with which they are connected. Much general and statistical information about railways is also concisely presented.

New features in this edition are referred to on page 215

THE DIRECTORY PUBLISHING CO. LTD.
 33, Tothill Street, London, S.W.1.

OFFICIAL ADVERTISEMENTS.

OFFICIAL ADVERTISEMENTS intended for insertion on this page should be sent in as early in the week as possible. The latest time for receiving official advertisements for this page for the current week's issue is noon on Thursday. All advertisements should be addressed to:—The Railway Gazette, 33, Tothill Street, Westminster, London, S.W.1.

RAILWAY AND OTHER REPORTS

Great Western Railway.—The gross receipts from railway and ancillary businesses for the half-year ended June 30, 1936, were £409,000 more than in the corresponding period of last year, whilst expenditure increased by approximately £259,000. The increase in net revenue from all sources, including interest, amounted to £39,000. The total increase in railway receipts was £449,000, passenger train receipts showing an increase of £95,000; goods train receipts an increase of £347,000; and miscellaneous receipts an increase of £7,000. On the other hand, the decline in revenue at the company's docks amounted to £55,000. In arriving at these figures no credit has been taken in respect of the reduction recently agreed in the basis of assessment to local rates. After making a temporary appropriation from free reserves, the directors have decided to declare an interim dividend of one quarter per cent. on the consolidated ordinary stock for the half-year ended June 30. Dividend warrants will be posted on August 19.

Benguela Railway.—The 1935 accounts of this company, which is controlled by Tanganyika Concessions Limited, show a profit of £1,271, to which has been added a debt of £57,220 waived by the controlling company, making £58,491. This has been applied in writing down stock by £27,273,

providing £3,036 for doubtful accounts, adjustment of railage on ore traffic, &c., and creating a renewal fund of £28,183. Deviations at Lengue and Caimbambo, the construction of which was indispensable to secure the regular running of trains, were opened to traffic during the year.

Fishguard & Rosslare Railways & Harbours.—The statement for the half-year ended June 30, shows a balance of £39,430 to the credit of revenue account. Debenture interest absorbed £13,904, guaranteed preference dividend £21,659, and 1914 preference dividend £3,867.

Nyasaland Railways.—The report for 1935 states that the construction of the northern extension from Blantyre to Salima with Lake Port at Chipoka was completed and the line opened for public traffic on July 1, 1935. The accounts therefore include the results of the working of the northern extension for six months. The Zambesi bridge and the south approach line to the bridge have been in use since September, 1935. The funds with which the advances to the Central Africa Railway Company and the Trans-Zambesia Railway Company have been made have been obtained by the issue to the Nyasaland Government of 5 per cent. bridge debenture stock of the company. Gross receipts for the year amounted to £104,109, and working expenses to

£68,222. After crediting dividend receipts, &c., and meeting interest charges the balance carried forward is reduced from £1,070 to £863.

Metropolitan Railway Surplus Lands Co. Ltd.—The directors have declared an interim dividend of 1½ per cent., the same as a year ago.

Dublin United Tramways Co. (1896) Ltd.—The directors have decided to pay an interim dividend of 2 per cent. on the ordinary stock; no dividend was paid in respect of the year 1935, but for 1934, 3 per cent. in all was distributed, including 1 per cent. interim.

Gloucester Railway Carriage & Wagon Co. Ltd.—The accounts for the year ended May 31 show a net profit of £2,472 (against £1,635 for 1934-35), and this is added to the balance forward, making it £7,669. The directors report a better position regarding orders for the company's products than for many years past. There has, however, been considerable delay in the execution of certain large orders due to circumstances outside the control of the company, and consequently only a small portion of these orders is reflected in the accounts. The satisfactory condition of the company's wagon hiring business has been fully maintained. The subsidiary, the Gloucester Foundry Limited, continues to make satisfactory profits. The directors have redeemed a further block of debentures amounting to £164,685.

Railway Share Market

The further reduction in the unemployment figures and the encouraging reports which continue to come to hand from trade centres tended to maintain a very firm undertone in the stock and share markets despite the reduction in the volume of business which has been more in evidence this week owing to holiday influences.

Home Railway stocks were again one of the main centres of interest, largely because of the belief that the proposed settlement of the wages question is likely to be accepted and the excellent impression created by the past week's traffics which were rather in excess of general expectations. It is being assumed in the market that the savings in rates will more than offset the increased wages expenditure, and although it is realised that still larger sums are likely to be expended on new rolling stock and other equipment,

it is assumed that the upward trend in traffics will probably be accelerated. The market view is that on present indications there are reasonable chances of a resumption of dividends on L.M.S. ordinary stock for the current year with a payment of possibly 1 per cent., while there are now growing hopes that L.N.E.R. second preference may possibly receive a fractional payment. L.M.S. stocks were outstanding in view of the excellent impression created by the interim statement and the particularly encouraging points indicated in the railway's position and outlook. On Wednesday following the announcement of the £130,000 increase in the past week's traffics, the ordinary stock rose further to 27, while the 4 per cent. preference and 1923 preference, which were favoured on the apparently attractive yields offered, moved up to 90 and 77½ respectively.

L.N.E.R. first preference were good at 72 on growing confidence that the full 4 per cent. dividend is in prospect for the year; the second preference were 28 and the deferred and preferred were also better on the £81,000 rise in last week's takings, it being hoped that these junior stocks may respond favourably if the good trend in traffic is accelerated. Southern preferred and deferred responded to the better tendency on satisfaction with the £17,000 gain in last week's traffics. Great Western was 50½ and was in increasing demand following the announcement of the £38,000 traffic gain for last week. London Transport "C" stock participated in the upward movement.

Among foreign railway stocks chief interest attached to Argentine stocks on the improved Argentine exchange position and the rise in the price of wheat. B.A. Gt. Southern gained fully a point to 16½ and B.A. Western, B.A. Pacific and Central Argentine were fractionally higher. Elsewhere, San Paulo showed favourable recovery. Canadian Pacific issues were steady.

Traffic Table of Overseas and Foreign Railways Publishing Weekly Returns

Railways	Miles open 1935-36	Week Ending	Traffics for Week		No. of Weeks	Aggregate Traffics to Date			Shares or Stock	Prices			
			Total this year	Inc. or Dec. compared with 1935		Totals		Increase or Decrease		Highest 1935	Lowest 1935	Aug. 5, 1936	Yield (See Note)
						This Year	Last Year						
South & Central America.													
Antofagasta (Chili) & Bolivia	834	2.8.36	£ 13 220	+ £ 2,350	31	£ 417,300	£ 383,440	+ £ 33,860	Ord. Stk.	23	14½	16	Nil
Argentine North Eastern ..	753	1.8.36	10,129	+ 1,245	5	41,987	39,646	+ 2,341	"	7	4	3½	Nil
Argentine Transandine ..	—	—	—	—	—	—	—	—	A. Deb.	49½	30	47½	87½
Bolivar	174	June, 1936	6,200	+ 200	26	41,000	39,400	+ 1,600	6 p.c. Deb.	13	5	10	Nil
Brazil	—	—	—	—	—	—	—	—	Bonds	14	11	15½	3¼
Buenos Ayres & Pacific ..	2,806	1.8.36	74,766	+ 1,852	5	339,915	362,026	+ 22,111	Ord. Stk.	10½	47½	8	Nil
Buenos Ayres Central ..	190	18.7.36	\$111,000	+ \$4,400	3	\$332,500	\$361,800	+ \$29,300	Mt. Deb.	21	10	15½	Nil
Buenos Ayres Gt. Southern	5,084	1.8.36	108,431	+ 6,375	5	486,336	559,347	+ 73,011	Ord. Stk.	27	13½	17	Nil
Buenos Ayres Western ..	1,930	1.8.36	43,443	+ 3,443	5	179,871	196,203	+ 16,332	"	24	10	14	Nil
Central Argentine	3,700	1.8.36	135,416	+ 11,632	5	581,250	612,257	+ 31,007	"	177½	7	11½	Nil
Do.	—	—	—	—	—	—	—	—	Dfd.	9	3¼	6½	Nil
Cent. Uruguay of M. Video	273	25.7.36	10,119	+ 1,818	4	37,397	32,692	+ 4,705	Ord. Stk.	8½	3	4	Nil
Do. Eastern Extn.	311	25.7.36	1,969	+ 568	4	6,763	6,331	+ 432	—	—	—	—	—
Do. Northern Extn.	185	25.7.36	1,448	+ 165	4	5,526	5,113	+ 413	—	—	—	—	—
Do. Western Extn.	211	25.7.36	920	+ 130	4	3,428	2,533	+ 895	—	—	—	—	—
Cordoba Central	1,218	1.8.36	39,296	+ 4,270	5	172,150	171,650	+ 500	Ord. Inc.	4	1	1½	Nil
Costa Rica	188	May, 1936	17,449	+ 3,582	48	159,922	176,238	+ 16,316	Stk.	35	30	33½	6½
Dorada	70	June, 1936	13,600	+ 1,900	26	79,300	66,800	+ 12,500	1 Mt. Db.	103½	102½	104½	5¼
Entre Rios	810	1.8.36	12,541	+ 1,930	5	54,729	59,500	+ 4,771	Ord. Stk.	15	6½	7	Nil
Great Western of Brazil ..	1,082	1.8.36	6,400	+ 1,400	31	235,300	237,500	+ 2,200	Ord. Sh.	12	5½	12	Nil
International of Cl. Amer.	794	June, 1936	237,915	+ \$7,469	26	\$2,996,615	\$2,632,186	+ \$364,429	—	—	—	—	—
Interoceanic of Mexico ..	—	—	—	—	—	—	—	—	1st Pref.	12	2½	12	Nil
La Guaira & Caracas ..	22½	July, 1936	4,910	+ 1,185	30	32,250	27,570	+ 4,680	Stk.	8½	8	5½	Nil
Leopoldina	1,918	1.8.36	21,134	+ 1,366	31	542,504	503,255	+ 39,249	Ord. Stk.	8½	2½	4½	Nil
Mexican	483	31.7.36	\$364,500	+ \$57,210	4	\$1,023,500	\$1,150,000	+ \$126,500	"	11½	14	3½	Nil
Midland of Uruguay ..	319	June, 1936	7,548	+ 1,791	52	86,428	111,833	+ 25,405	"	11½	11½	11½	Nil
Nitrate	397	31.7.36	4,941	+ 2,870	30	80,996	88,805	+ 7,809	Ord. Sh.	64½	42½	29½	Nil
Paraguay Central	274	1.8.36	32,780,000	+ \$809,000	5	\$12,005,000	\$10,073,000	+ \$1,932,000	Pr. Li. Stk.	80½	60	72½	8½
Peruvian Corporation ..	1,059	July, 1936	84,321	+ 10,508	4	84,321	79,813	+ 4,508	Pref.	106½	67½	102½	Nil
Salvador	100	25.7.36	£8,145	+ £9,155	4	£3,188	£5,588	+ £2,400	Pr. Li. Db.	65	61	30	16½
San Paulo	153½	26.7.36	33,480	+ 6,512	30	888,627	715,873	+ 172,754	Ord. Stk.	80	35	52½	4½
Taital	164	June, 1936	4,220	+ 1,345	52	42,725	36,940	+ 5,785	Ord. Sh.	111½	11½	11½	7½
United of Havana	1,353	1.8.36	14,417	+ 4,831	5	73,124	94,520	+ 21,396	Ord. Stk.	31½	1	2½	Nil
Uruguay Northern	73	June, 1936	778	+ 154	52	9,922	12,107	+ 2,185	Deb. Stk.	4½	2½	4½	Nil
Canada.													
Canadian National	23,615	31.7.36	1,035,960	+ 8,999	30	20,151,544	19,005,943	+ 1,145,601	—	—	—	—	—
Canadian Northern ..	—	—	—	—	—	—	—	—	Perp. Dbs.	78½	52½	66½	6
Grand Trunk	—	—	—	—	—	—	—	—	4 p.c. Gar.	103½	93	101½	3½
Canadian Pacific	17,237	31.7.36	776,600	+ 9,800	30	14,724,400	13,531,600	+ 1,192,800	Ord. Stk.	141½	8½	12	Nil
India.													
Assam Bengal	1,329	10.7.36	32,625	+ 770	14	343,182	328,222	+ 14,960	Ord. Stk.	92½	77½	85½	3½
Barsi Light	202	10.7.36	4,140	+ 2,350	14	38,933	40,673	+ 1,740	Ord. Sh.	105	77½	72½	6½
Bengal & North Western	2,112	10.7.36	71,425	+ 7,869	14	800,432	768,585	+ 31,847	Ord. Stk.	301½	291	310	5½
Bengal Doars & Extension	161	30.6.36	3,451	+ 389	13	29,042	29,779	+ 737	"	127½	122	123½	5½
Bengal-Nagpur	3,268	10.7.36	150,075	+ 8,253	14	1,762,052	1,863,050	+ 100,998	"	105	100½	102½	3½
Bombay, Baroda & C. India	3,072	20.7.36	189,000	+ 17,925	16	2,728,800	2,551,300	+ 177,500	"	115½	110	111½	5½
Madras & Southern Mahratta	3,229	10.7.36	157,500	+ 10,101	14	1,659,116	1,623,270	+ 35,846	"	128½	113½	112½	8
Rohilkund & Kumaon ..	561	10.7.36	11,271	+ 802	15	165,947	153,078	+ 12,869	"	294	262	208½	5½
South India	2,532	10.7.36	112,578	+ 1,795	14	1,143,594	1,168,138	+ 24,544	"	119½	104½	103½	5½
Various.													
Beira-Umtali	204	May, 1936	70,177	+ 124	35	513,150	520,214	+ 7,064	—	—	—	—	—
Bilbao River & Cantabrian	15	June, 1936	1,397	+ 136	26	8,525	9,905	+ 1,380	—	—	—	—	—
Egyptian Delta	620	20.7.36	6,148	+ 624	16	63,624	58,038	+ 5,586	Prf. Sh.	2	15½	1¼	51½
Great Southern of Spain ..	104	25.7.36	434	+ 902	30	31,695	52,868	+ 21,173	Inc. Deb.	3½	2	3½	Nil
Kenya & Uganda	1,625	June, 1936	204,162	+ 40,600	26	1,430,672	1,293,183	+ 137,489	—	—	—	—	—
Manila	—	—	—	—	—	—	—	—	B. Deb.	48	36	39½	4½
Mashonaland	913	May, 1936	105,936	+ 19,948	35	815,155	945,921	+ 130,766	1 Mg. Db.	104½	100	103½	4½
Midland of W. Australia ..	277	June, 1936	11,961	+ 222	52	161,372	159,574	+ 1,798	Inc. Deb.	98½	93	93½	4½
Nigerian	1,905	13.6.36	23,265	+ 2,681	11	326,213	284,191	+ 42,022	—	—	—	—	—
Rhodesia	1,538	May, 1936	182,817	+ 15,586	35	1,479,847	1,542,173	+ 62,326	4 p.c. Db.	105½	101	105½	3½
South African	13,263	11.7.36	594,251	+ 37,723	15	8,884,820	7,950,718	+ 934,102	—	—	—	—	—
Victoria	4,728	Dec., 1935	866,995	+ 3,320	26	4,826,292	4,751,974	+ 74,318	—	—	—	—	—
Zafra & Huelva	112	May, 1936	8,821	+ 2,027	22	48,574	55,398	+ 6,823	—	—	—	—	—

NOTE.—Yields are based on the approximate current prices and are within a fraction of 1%.
 † Receipts are calculated @ 1s. 6d. to the rupee. ‡ ex dividend. Salvador and Paraguay Central receipts are in currency.
 The variation in Sterling value of the Argentine paper peso has lately been so great that the method of converting the Sterling weekly receipts at the par rate of exchange has proved misleading, the amount being overestimated. The statements from July 1 onwards are based on the current rates of exchange and not on the par value.

Diesel Railway Traction

Main Line Diesel Locomotives

NO field of railway traction, except heavy goods working, has been less disturbed by diesel units than the operation of heavy main-line trains. Indeed, until the evolution of the streamlined set train in 1932-33, only in Siam, and to a slight degree in Denmark, were main line trains regularly hauled by diesel locomotives. The slow progress made by big diesel locomotives has been due mainly to the difficulty of building a single unit engine of really high power, for until that could be done a multi-engine layout was necessitated, and in turn this led to articulated or twin construction, the aggregate effect being to raise the cost to stratosphere level. Even now, many of the main line locomotives in use or building have more than one power unit, an uneconomical form which is excused by the plea of less chance of total failure on the line. The Atchison, Topeka & Santa Fe Railroad locomotive is of this type, and consists of two double bogie locomotives each fitted with two 900 b.h.p. Winton engines, two main generators and four electric motors. This locomotive operates the Super-Chief luxury train between Chicago and California, in the course of which it makes the fastest start-to-stop run in the world at an average of 83.7 m.p.h. The Baltimore & Ohio Railroad has a locomotive of 1,800 b.h.p. which is a duplicate of one half of the A.T.S.F. monster. It was tried first on the crack express, the Royal Blue, and was found to have insufficient power, but is now used on another crack train, the Abraham Lincoln, between Chicago and St. Louis, where its schedule of 4 hr. 55 min. competes with the 4 hr. 53 min. for 294 miles of the Illinois Central's *Green Diamond* streamlined diesel train described in our issue of May 15. Locomotives are not favoured to any great extent on the Continent so far as main-line diesel traction is concerned, but the two 4,000 b.h.p. locomotives now being built for the P.L.M. should give some indication as to whether a separate power unit is preferable to a streamlined train. Elsewhere in Europe main line locomotives are found only in Denmark (2), Germany (1), and the U.S.S.R. (about 15). In Argentina, Algeria, Siam, Canada and India large locomotives have been tried with varying success, but it seems possible that a change in operating methods by the adoption of set trains will give greater efficiency in the long run.

Supercharging in Rail Traction

WITH the increasing desire to use diesel vehicles of high power, developments in the application of supercharging have taken place in order to keep down the weight and space characteristics of high power engines installed in railcars and set trains, where a high power output per ton of weight is necessary. The first supercharging equipments used in railway work were fitted by Krupp to engines for Japan and Germany, and to the Baldwin-Krupp 1,000 b.h.p. oil-electric shunting locomotive of 1929. Present practice in supercharging favours the Büchi and Rateau systems, which are applied mainly to railcars and trains, the only locomotive application within recent months being to the three locomotives for the Congo-Ocean Railway, although the two 4,000 b.h.p. locomotives being built for the P.L.M. are to have super-

chargers. Both the Büchi and Rateau principles employ turbo-blowers driven by the exhaust gases of the engine. With the light-weight high-speed types of engine the continuous output is increased by about 30 per cent. for an increase in weight of 8 to 10 per cent. In the case of the Maybach engines fitted to the triple-car trains of the Reichsbahn the output of the supercharged engine is 600 b.h.p. compared with 410 b.h.p. of the ordinary type, but the cylinder diameter is increased by 0.375 in., which accounts for a proportion of the increase. The output of these turbo-blowers, the amount of air they deliver, and the charging pressure adjust themselves automatically to the load on the engine. Supercharging effects an economy in the fuel consumption, especially at fractional loads, the curve of specific fuel consumption being almost flat from half to full load. Tests on the M.A.N. type of engine fitted to the locomotives of the Congo-Ocean Railway (see issue of this Supplement for April 19, 1935) showed a reduction in fuel consumption from 0.387 to 0.376 lb. per b.h.p. hr. on the hourly rating. The heat balances for the engine with and without supercharger were as given below.

	Non-supercharged, 700 b.h.p.	Supercharged, 950 b.h.p.
Expended in useful work	445,000 cal.	605,000 cal.
Lost to lubricating oil	40,000 "	45,000 "
Lost to cooling water	310,000 "	250,000 "
Lost in exhaust gases	410,000 "	690,000 "
Miscellaneous losses	25,000 "	30,000 "
Total	1,230,000 cal.	1,620,000 cal.
Thermal efficiency of engine	36.1 per cent.	37.3 per cent.

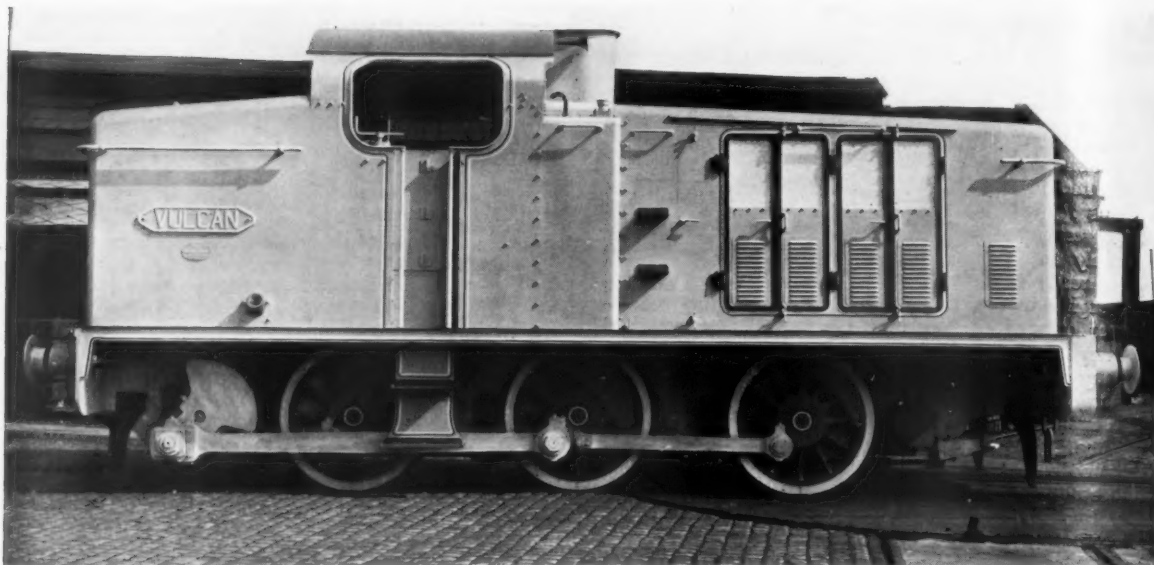
Among the remaining advantages of supercharged engines is somewhat quieter running, greater engine flexibility, and a smaller size of radiator due to the smaller proportion of heat taken up by the cooling water.

A New Make of Diesel Locomotive

ALTHOUGH, apart from the extensive use of oil-engined shunters on the L.M.S.R., the merits of diesel locomotives have received scant recognition by British railways, yet another British firm has had the courage to inaugurate production of such units. The new Vulcan locomotive is the largest British diesel locomotive with mechanical transmission and is 50 per cent. greater in power than the previous largest unit. As with the majority of the diesel-mechanical locomotives of 150-200 b.h.p. built for the L.M.S.R. about two years ago, exceptionally simple controls have been provided in this Vulcan locomotive, and the design marks a stage in the attainment of absolutely foolproof controls in that it is impossible to change directly more than one gear stage at a time. The construction of the mechanical portion is of a very robust character, and should enable the locomotive to withstand without any ill-effect the frequent and heavy buffing and drag stresses of shunting service. Considering the total weight of 46 tons the maximum tractive effort of 20,300 lb. is not high, although it is fully equal to the pull of the majority of British steam shunters. However, in view of the engine power and the provision of five gear steps and a top speed well over 40 m.p.h., the Vulcan locomotive must be considered more as the equivalent of the medium-sized 0-6-0 goods locomotive.

A NEW BRITISH DIESEL LOCOMOTIVE

275 b.h.p. unit with pre-selective mechanical transmission



Diesel mechanical locomotive for mixed service on standard gauge lines

THE diesel-mechanical locomotive just completed by the Vulcan Foundry Limited is suitable for shunting duties and for local goods and slow passenger trains such as are operated by the ordinary type of British six-coupled goods engine. This diesel locomotive is itself of the six-coupled type with rod drive from a jackshaft, and is provided with extra gear ratios above those normally used for shunting, so that it can attain a top rail speed of 46 m.p.h. with normal engine speed.

Standard steam locomotive practice has been followed generally in the construction of the mechanical portion, which thus is of a robust nature. One of the main frame stays forms the bedplate of the oil engine. Compressed air and hand brakes are fitted and actuate blocks on all wheels. Weighing 46 tons in working order, the locomotive has a tractive effort on the bottom gear step of 20,300 lb., giving a factor of adhesion of just over 5.0. The locomotive has been operating in shunting service in the yard of the Vulcan Foundry for some time past, and it is understood that shortly it will be tried out on the lines of the L.M.S.R. Electric lighting is provided, the current being generated by a C.A.V. Bosch dynamo.

The Engine

Power is provided by an oil-engine of the Frichs type, for which the Vulcan Foundry is the British licensee. The engine actually installed in the locomotive was built at Aarhus, but a second engine of the same type has been built at the Vulcan Foundry, and is shown on the test bed in one of the accompanying illustrations. The engine is of the Frichs 6215 CL type, and develops a continuous output of 275 b.h.p. at 775 r.p.m. in six cylinders 215 mm. by 280 mm. (8.5 in. by 11.0 in.). The unit weight is 31 lb. per b.h.p. At a short-time rating the engine can develop 300 b.h.p. The cylinder block is a steel casting into which are pressed cast iron liners, held rigidly at the top and free to expand at the bottom.

The crankshaft is carried on seven bearings having white-metal linings on steel bushes, and the big ends have white-metal linings on bronze bushes. Heat-treated aluminium alloy is used for the pistons. The cylinder heads are of special cast iron and are fitted with one inlet and one exhaust valve, an atomiser, and a safety valve, the first two valves being operated from a single camshaft.

The engine is safeguarded against overspeed when running downhill by a centrifugal governor which releases the pressure of the air engaging the transmission clutches. It is also protected against damage from a failure in the lubricating oil supply, for the governor controlling the fuel delivery is servo-assisted by the lubricating oil pressure, and the fuel by-pass valves remain open if this

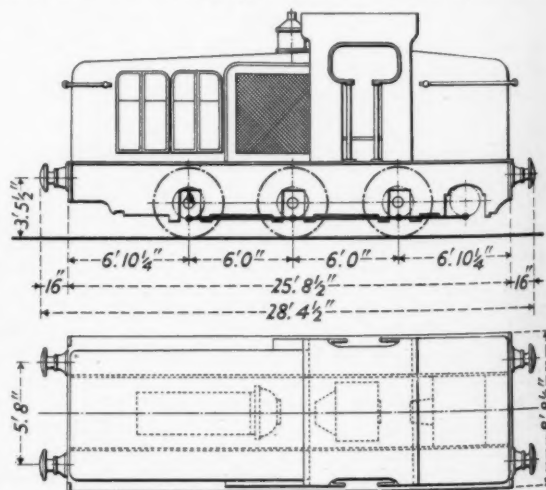


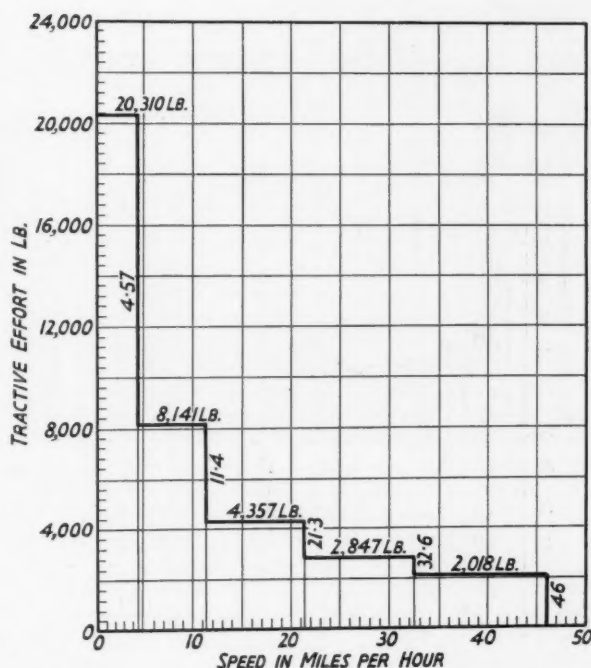
Diagram of Vulcan diesel locomotive

pressure falls too low. The fuel pump itself, and the pre-pressure pump for drawing fuel from the tank and flooding the injection pump, are of the Frichs type. Air starting is provided, and an engine-driven two-stage compressor pumps up the starting air to a pressure of 450 lb. per sq. in. This air is stored in three steel bottles behind the driving cab, where also is situated a 200-gal. fuel tank. The air supply is supplemented by a set comprising a single cylinder Lister petrol engine driving another two-stage Reavell compressor. Cooling of the main engine circulating water is effected in a radiator built by the Spiral Tube & Components Co. Ltd.

The Transmission

The mechanical transmission consists of a Vulcan-Sinclair ring-valve fluid coupling, a five-speed Wilson epicyclic gearbox, a reverse box and double-reduction gear, a jackshaft, and driving and coupling rods. The main function of the fluid coupling is to save wear in the gearbox clutches and to provide a shockless drive, and, of course, it prevents stalling of the engine. The ring-valve type of coupling gives a greater latitude in the choice of the engine idling speed, the drag torque with the ring-valve closed being relatively small.

The band tightening struts in the Wilson gearbox are pushed into the operative position by air pistons and there are two larger pistons for raising the bus bar and engaging the fifth speed clutch respectively. These are the pistons which become inoperative if the engine speed tends to become excessive. Air to each of these two pistons is supplied through a valve controlled by the other; thus it is impossible to actuate both simultaneously and thereby damage the transmission. Air for operating the gearbox clutches is taken from the engine starting air bottles, and is passed through a valve which reduces its pressure to 110 lb. per sq. in. Each gear is selected and engaged with the ring valve of the hydraulic coupling closed, the engine idling meanwhile, and the drive is taken up by opening the ring valve. The five gear ratios are 9.9 : 1; 4.0 : 1; 2.15 : 1; 1.41 : 1; and 1.0 : 1,

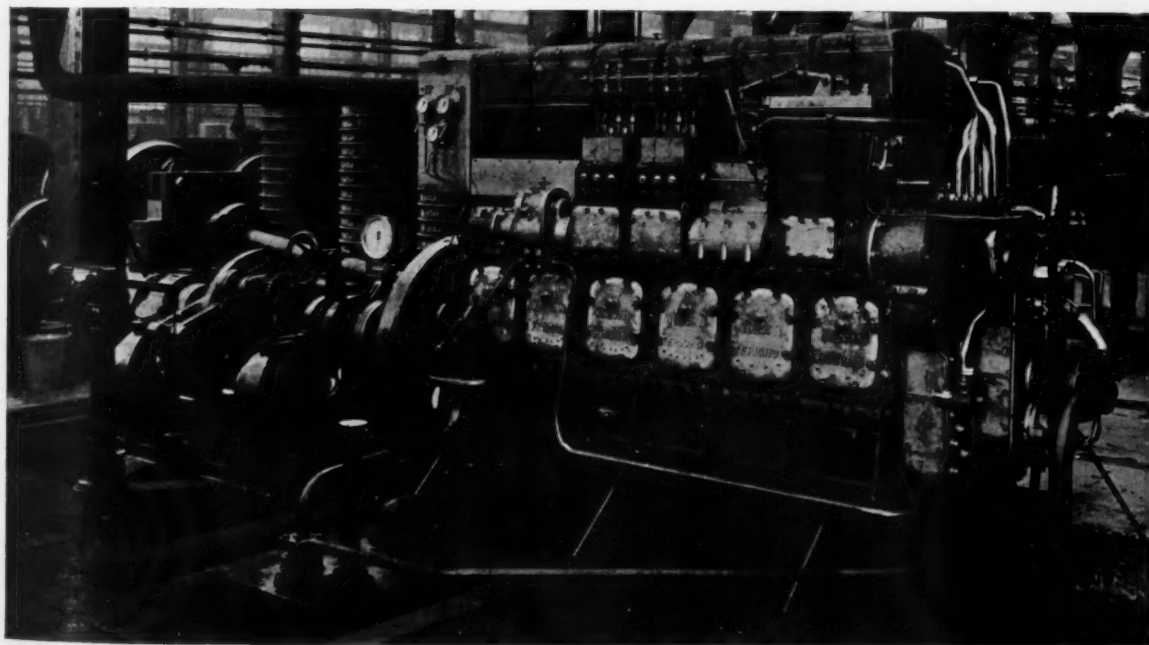


Speed-tractive effort curve of Vulcan diesel locomotive

and they give road speeds as indicated on the accompanying speed-tractive effort diagram.

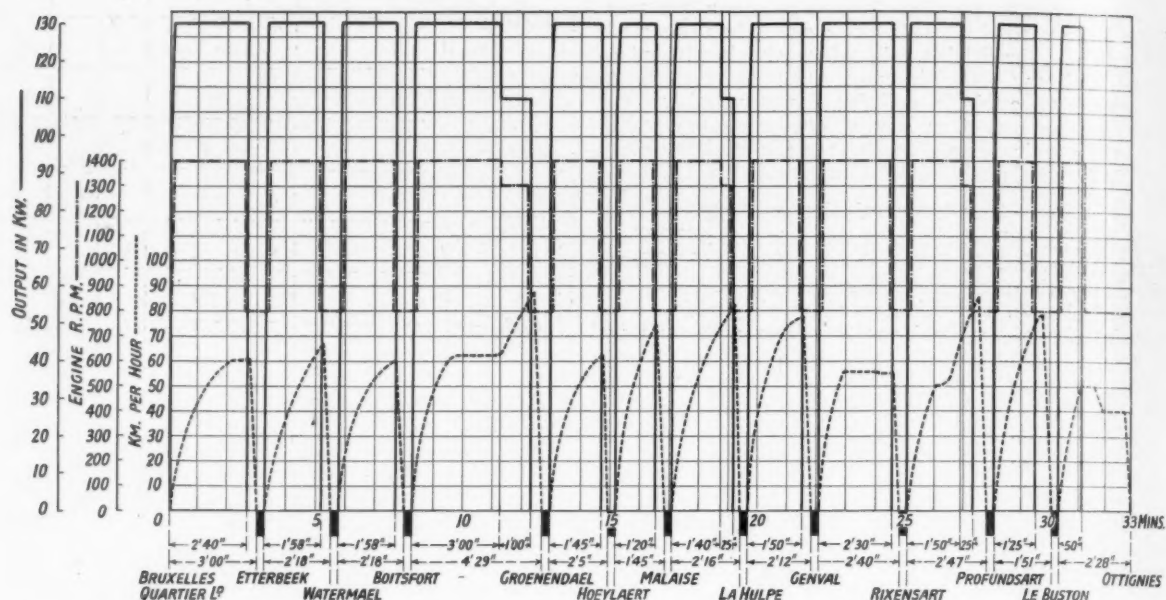
On each side of the gearbox are flexible couplings to accommodate slight flexing of the main frame. These resemble ordinary flange couplings, but the bolts in one half are rubber bushed. The jackshaft is solid forged with cranks at each end; it is supported on Ransome & Marles roller bearings of sufficiently large internal

(Concluded on page 250.)



275 b.h.p. Frichs type of engine built by the Vulcan foundry

MULTI-STOP DIESEL SERVICES IN BELGIUM



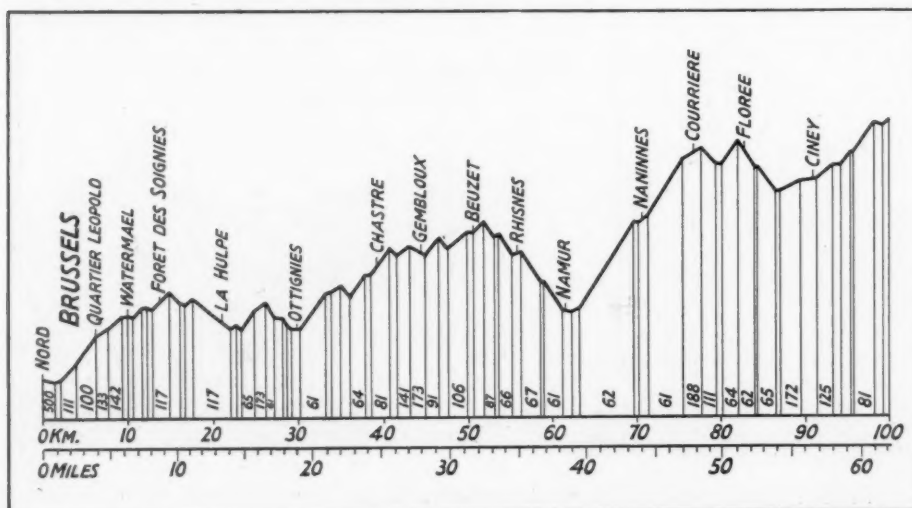
Power and speed records of a 210 b.h.p. diesel-electric railcar on frequent-stop service on the Belgian National Railways. The profile of the line is shown below. Power and speed measurements were taken every 10 seconds

BRUSSELS-OTTIGNIES, OIL ENGINE OPERATION

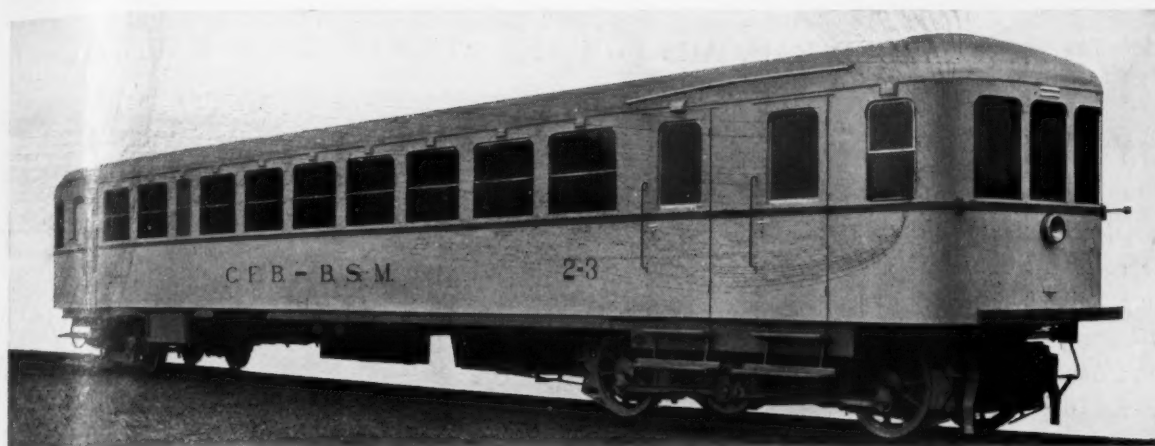
Time in Seconds

At 1,400 r.p.m.	At 1,300 r.p.m.	Idling	Total
160	—	20	180
118	—	20	138
118	—	20	138
180	60	29	269
105	—	20	125
80	—	25	105
100	25	11	136
110	—	22	132
150	—	10	160
110	25	32	167
85	—	32	117
50	—	98	148
1,366	110	339	1,815

A SUCCESSFUL innovation of the Belgian National Railways in order to regain traffic lost to the roads was the introduction a year or two ago of very light stopping trains running to greatly accelerated schedules. These trains consisted normally of a 4-4-2T steam locomotive and two light carriages and they had not been at work long before they were dubbed by the Belgian public "trottinettes," the literal translation of which is "scooters." Early last year some of the 175 and 210 b.h.p. diesel-mechanical railcars were put to work on these accelerated timings and have performed exceedingly well on what is really an arduous duty, particularly with motive power of a definitely limited output.



Profile of Brussels-Ottignies section of the Luxembourg main line over which power and speed measurements were made as shown on the accompanying diagrams



Double-bogie 210 b.h.p. diesel-electric car of the type which is used on the "trottinette" services on various routes of the Belgian National Railways

One of the hardest of these "trottinette" turns is on the Luxembourg main line out of Brussels as far as Ottignies, where the grades are somewhat severe. Diesel railcars have been working regularly over this route, and the two graphs accompanying this article show the results of test measurements recorded with a double-bogie diesel-electric railcar powered by a 210 b.h.p. Maybach engine and fitted with A.C.E.C. electrical equipment. The mechanical portion of the car was built by La Brugeoise, Nicaise et Delcuve.

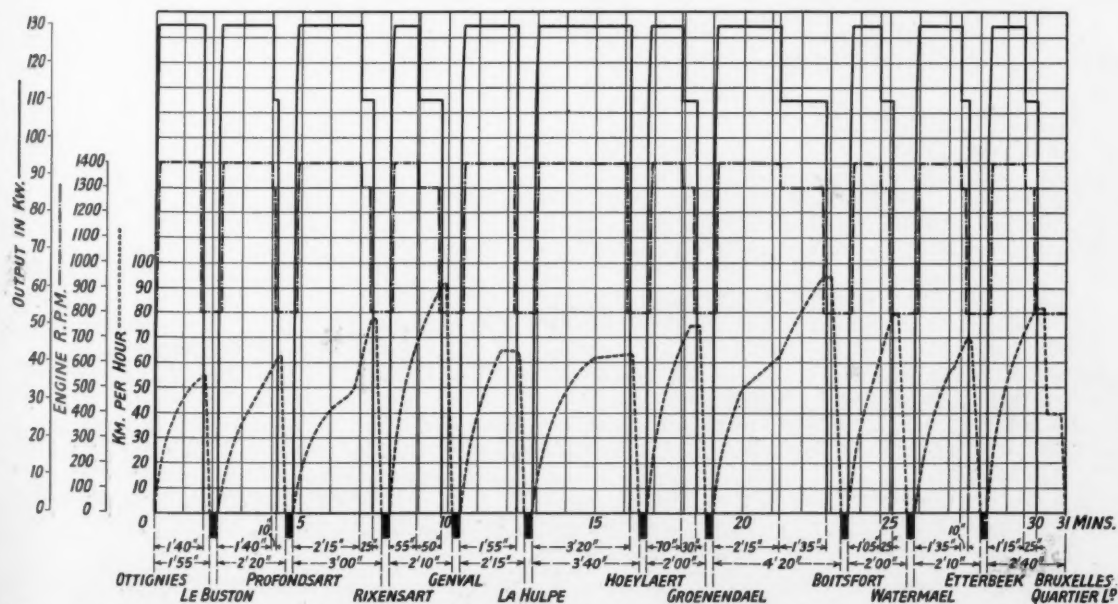
The curves reproduced show that the engine was developing approximately its full output for 67 to 76 per cent. of the full running time, and that the acceleration from rest varied from 0.48 to 0.8 m.p.h. p.s. up to about 30 m.p.h., the former figure being obtained up a 1 in 117 grade. Full engine power was used almost from the start until a brief period of coasting before the brake application. The retardation rates also were relatively high, and stops were made from 59 m.p.h. in 24 sec.

210 B.H.P. DIESEL MECHANICAL RAILCAR

OTTIGNIES-BRUSSELS, OIL ENGINE OPERATION

Time in Seconds

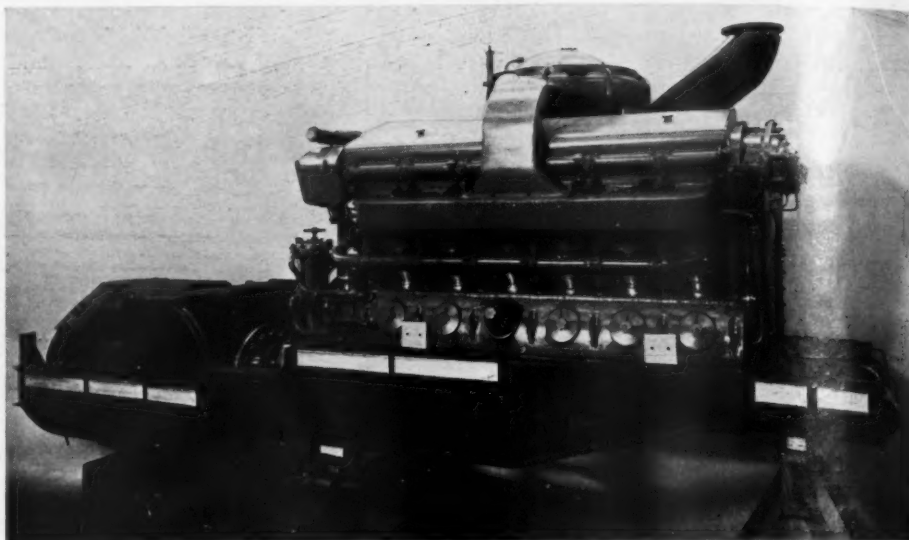
At 1,400 r.p.m.	At 1,300 r.p.m.	Idling	Total
100	—	15	115
110	10	20	140
135	25	20	180
55	50	25	130
115	—	20	135
200	—	20	220
70	30	20	120
135	95	30	260
65	25	30	120
95	10	25	130
75	25	60	160
1,155	270	285	1,710



Power and speed records of a 210 b.h.p. diesel-electric railcar of the Belgian National Railways when running from Ottignies to Brussels in frequent-stop service. Power and speed measurements were taken every ten seconds

SUPERCHARGED RAILCARS FOR THE GERMAN STATE RAILWAY

A development of the standard 410/420 b.h.p. diesel - electric railcars of the Reichsbahn has been made by the installation of a supercharger giving a 30 per cent. increase in engine output

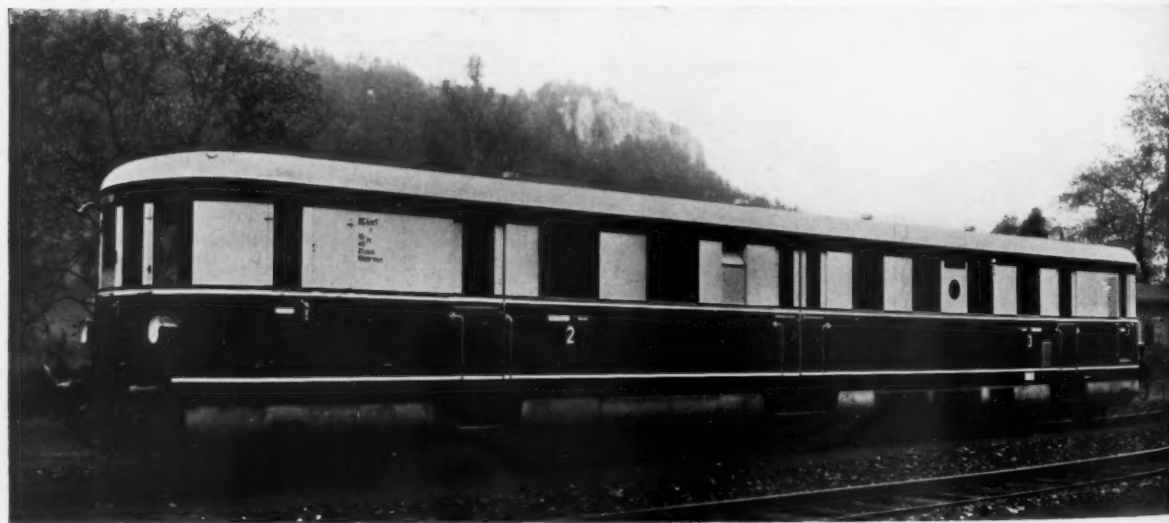


560 b.h.p. M.A.N. engine with Büchi supercharger, d.c. generator, and steel subframe

AMONG the numerous high power double-bogie diesel-electric railcars of almost standard construction which are running all over the Reichsbahn system are a number having the 420 b.h.p. M.A.N. engine of both the single and double crankshaft design. A development of these vehicles has been made by the incorporation of a Büchi supercharger, thereby raising the engine output to 560 b.h.p. These cars are used mainly on heavily graded lines over which they pull one or two trailers at the usual service maximum speed of 100 km.p.h. (62 m.p.h.). With a fully loaded railcar and trailer totalling 80.6 tonnes, an acceleration to 40 km.p.h. (24.8 m.p.h.) has been obtained in one minute on a grade of 1 in 40, the top speed up the grade being 49 km.p.h. (30.4 m.p.h.).

A departure from normal standard Reichsbahn practice

has been made on these 560 b.h.p. cars by mounting the engine on the underframe instead of directly on the bogie. Along with its attached generator it is carried on a welded steel subframe which is mounted flexibly on the body, so that the minimum amount of engine vibration is transmitted to the passenger saloons. It is claimed that the vibration of the car is only half that of the standard cars with bogie-mounted engines. The 12-cylinder twin-shaft engine with the supercharger, d.c. main generator and carrying frame are shown in the illustration at the head of this page. The cylinders are 175 mm. bore by 180 mm. stroke (6.9 in. by 7.1 in.), the rotational speed 1,400 r.p.m., and the weight about 16.5 lb. per b.h.p. The newest railcars of this type are being fitted with the single crankshaft engine of the design illustrated on page 181 of the January 24, 1936, issue of this Supplement.



50-ton double-bogie diesel-electric railcar with a single engine of 560 b.h.p.

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The engine and its attached equipment is installed and removed through a detachable portion of the roof, and is protected by a sheet metal casing, through which the cylinder heads and crankcase are accessible by means of hinged doors. The air to the supercharger flows through ducts fed by suction openings in the side walls of the car, which are provided with flaps as a protection against rain. The noise caused by the suction of the air is damped by means of deflectors and felt inserts. Two fuel tanks, with an aggregate capacity of 1,000 kg. (2,200 lb.) are accommodated in the roof of the engine room. The main generator supplies current to two 175

kW. nose-suspended motors. There is a driving compartment at each end of the vehicle, and multiple unit control is fitted.

Built entirely of steel, with all-welded construction, the body seats 16 second class and 40 third class passengers, and has lavatory and 65 sq. ft. of luggage accommodation, the luggage space being arranged at the end of the car remote from the engine room. The car is heated by hot water from a coke-burning stove arranged below the floor. Both the second and the third class seats are upholstered. Ordinary couplers, buffers, and jumper cables are provided at each end of the vehicle.

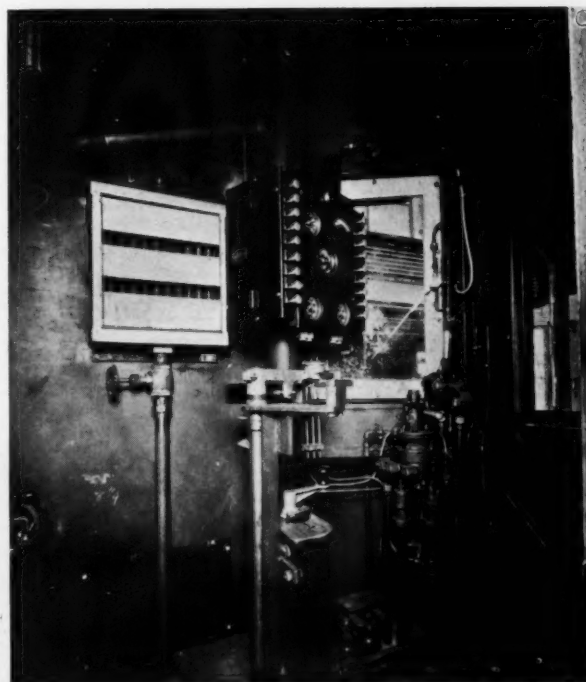
LARGEST SINGLE-UNIT DIESEL LOCOMOTIVE



A demonstration test of the latest Illinois Central diesel locomotive starting five freight trains

ANOTHER of the three heavy short-distance freight locomotives ordered by the Illinois Central Railroad has been placed in service. It is of the Co-Co type and is powered by a 10-cylinder two-stroke Busch-Sulzer engine, the largest single oil-engine yet applied to railway traction. The locomotive itself weighs 154.4 long tons and is the largest single-unit diesel locomotive in service.

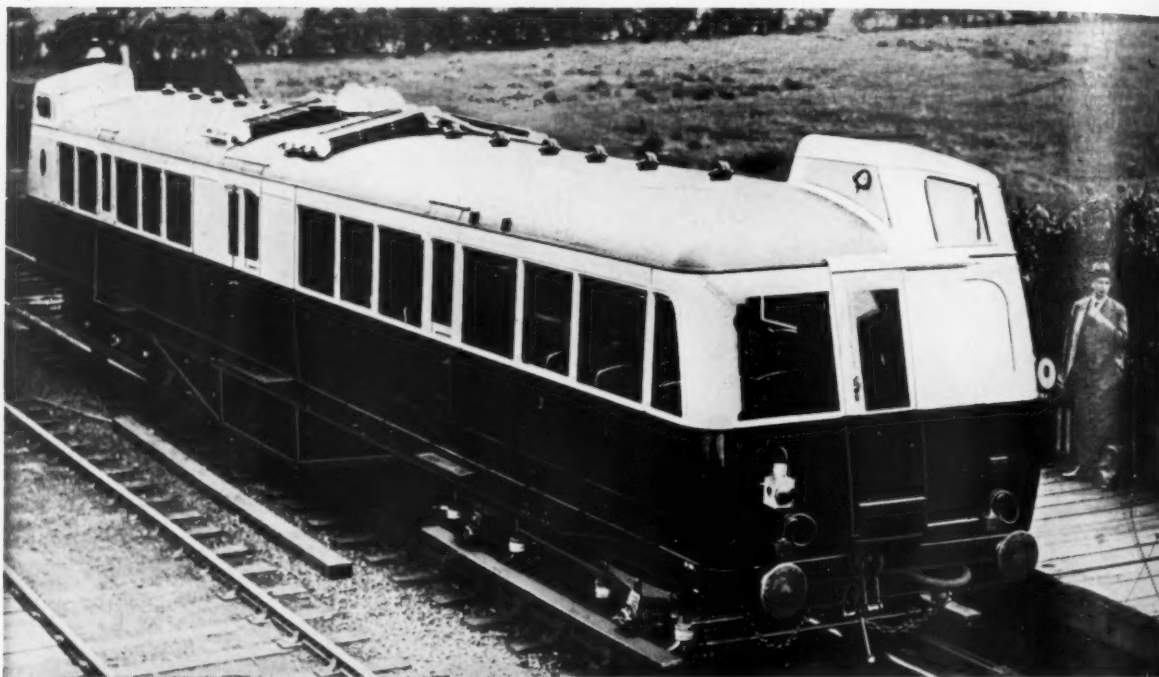
The Busch-Sulzer engine was described in detail in the issues of this Supplement for January 26 and March 23, 1934. The cylinders have a bore of 13.5 in. and the pistons a stroke of 16 in. The rotational speed is 550 r.p.m., the brake m.e.p. 63 lb. per sq. in., and the weight about 25 lb. per b.h.p. The mechanical and electrical portions of the locomotive were built at the Erie works of the General Electric Company of America (the Busch-Sulzer Company was the main contractor), and the illustration above shows the locomotive in the works yard starting five freight trains on converging tracks as a demonstration of its high tractive effort, which amounts to 85,500 lb. with a factor of adhesion of 4.0. The electrical equipment is designed to give a tractive effort of 35,100 lb. at 16.5 m.p.h. on the continuous rating, and a maximum speed of 60 m.p.h. The six nose-suspended motors drive their axles through gears with a ratio of 15:62, and double-end electro-pneumatic control with automatic transition of the motor grouping is provided. The wheels are 39 in. in diameter and are spread over a bogie wheelbase of 11 ft. The total wheelbase is 48 ft. and the overall length about 60 ft. New York air brakes are fitted, the compressors being of the General Electric type with a capacity of 200 cu. ft. per min.



The driving cab at one end of the Busch-Sulzer 2,000 b.h.p. locomotive

BIG DIESEL CAR INTRODUCED IN NORTHERN IRELAND

260 b.h.p. vehicle for trailer haulage



[Photo]

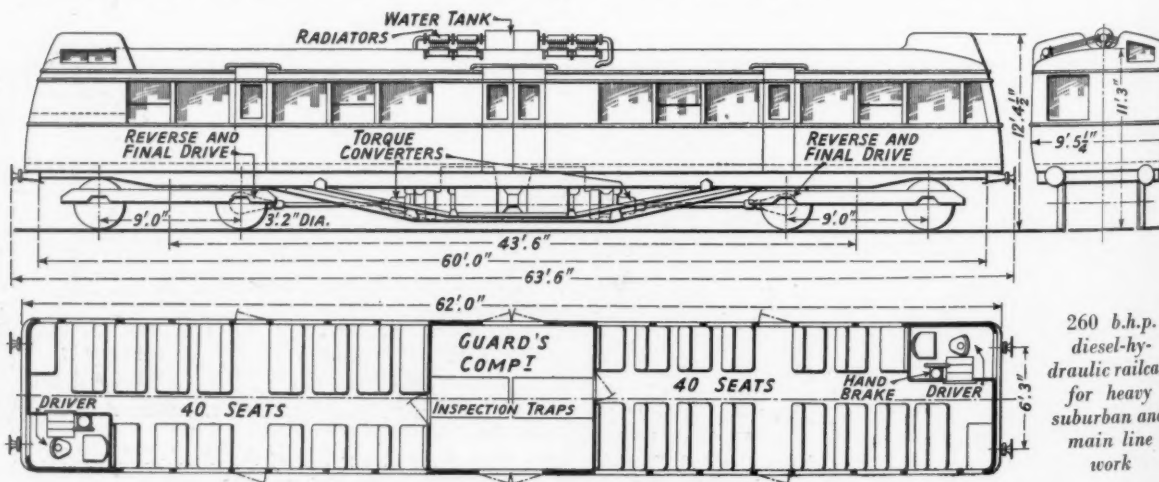
[Belfast Telegraph]

The latest diesel-hydraulic railcar of the Northern Counties Committee. It has a top speed of 70 m.p.h.

A NEW double-engined railcar has been set to work on the lines of the L.M.S.R. Northern Counties Committee and embodies the results of the extensive experience gained with car No. 2, which was introduced in 1934 and described in the issue of this Supplement for June 15 of that year.

Designed and built at the railway's Belfast works under the direction of Major Malcolm Speir, the Manager & Secretary of the N.C.C., and Mr. M. Patrick, the Locomotive Superintendent, the new car is powered by two Leyland 130 b.h.p. engines with hydraulic torque converters, which are mounted on the underframe of the car.

Each engine drives the inner axle of one of the bogies. The light alloy crankcases of the Leyland engines in No. 2 car have been given up in favour of cast iron in the new vehicle. The distinctive feature of the conning tower drive at each end of the car has been retained, but the body panelling is of steel in place of the aluminium which was used in the 1934 car. The body framing and underframing are of steel sections and are of light but rigid design, the details being based on the experience gained with the previous car.



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SPANISH RAILCAR PERFORMANCE

100 per cent. railcar operation on small line

AS a direct result of the substitution of diesel engines for those of the petrol type in its small railcars, the Villena, Alcoy and Yecla Railway, in Spain, has achieved considerable operating economies, mainly through the reduction in the fuel and lubricating oil bills. A feature of the railcar operation on this railway is that half the number of diesel railcars in service are engaged exclusively in light goods and parcels traffic. With the purchase of the last, or sixth, railcar early this year, steam traction has disappeared from the line, the complete traffic being operated now by six diesel and three petrol cars. During 1935 the fuel and repair costs for the railway were 121,442 pesetas, of which 39,600 pesetas were due to the steam locomotives then in service. For the last year of full steam operation the fuel and repair costs were 232,058 pesetas. Now that steam traction has been superseded entirely, it is expected that the cost of operation will be reduced by another 30,000 pesetas compared with the 1935 figure.

The diesel railcars, all of the four-wheeled type with mechanical transmission, which are now in operation are as follow:—

Railcar No.	Duty	B.h.p.	Engine	Year Put into Service	Km. in 1935	Total km. to end of 1935
No. 11	Passenger	55	M.W.M.	1933	111,049	313,615
" 13	"	75	"	1935*	95,998	95,098
" 14	"	50	Deutz	1935	76,497	76,497
" 21	Goods	110	"	1933	52,918	86,311
" 22	"	110	"	1935	30,000	30,000
" 23	"	50	"	1936	—	—
Totals				..	365,562	601,521

* Previously ran with a petrol engine.

The fuel and repair charges of the first four diesel cars during the year 1935 were as detailed below.

Running costs, Pesetas per km.	No. 11	No. 13	No. 14	No. 21
Fuel oil	0-0503	0-0589	0-0435	0-1466
Engine and car lubricating oil	0-0170	0-0308	0-0209	0-0814
Normal maintenance	0-0196	—	—	0-0676
Normal maintenance plus general overhaul	—	0-1470*	0-0580	—
Totals	0-0869	0-2367	0-1224	0-2956

* This includes cost of installing a diesel engine.

Freight car No. 21 in 1934 carried 13,652 tonnes of

goods and in 1935, 20,927 tonnes. Owing to the high proportion of the tare weight of the car (a ratio common to all vehicles carrying light goods), the total tonne-km. was 1,193,432 in 1934 and 1,773,302 in 1935. During the year 1935 the fuel and lubricating oil cost for the petrol cars amounted to 0-1982 pesetas per km. compared with 0-0673 to 0-0897 for the diesel cars of the same power, and the maintenance and repair costs (without general overhaul) averaged 0-1988 compared with 0-0748 pesetas per km. for the three diesels of similar size, one of which underwent modification equivalent in cost to a general overhaul, and the second of which had a regulation general overhaul. The petrol cars are now being used more as stand-by vehicles and for the lightest duties, and during 1935 the three of them made an aggregate mileage of only 35,863 km. It is likely that they will be fitted with diesel engines at some time in the future.

Fast Railcar for Norway

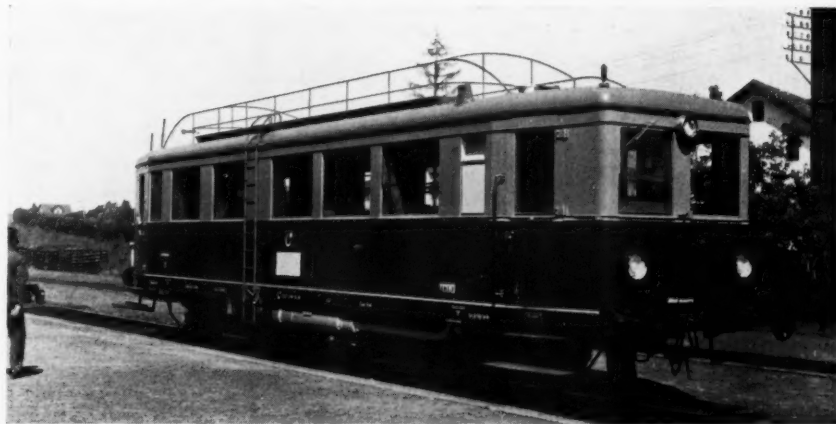
The question of using express railcars has been studied in Norway, where numerous curves and sharp gradients are against the attainment of high speeds. An investigation of the possibilities of diesel traction on the Oslo-Kornsjö (Swedish frontier) line showed that a speed of 100 km.p.h. (62 m.p.h.) could be reached only at certain spots by railcars of the normal type and that, owing to the curves, the average speed would not exceed 67 km.p.h. (41.5 m.p.h.).

To raise the speed on curves light-weight cars with a low centre of gravity are essential and the Norwegian State Railways therefore have ordered a two-car diesel train, the mechanical portion of which is fabricated mainly of duralumin. The railcar will have a length of 20.3 m. (66 ft. 6 in.) and will seat 77 passengers. The trailer will be 18.2 m. (59 ft. 9 in.) long and will seat 69 passengers. The maximum speed in service will be limited to 100 km.p.h. (62 m.p.h.).

Studies made by the Strommens Verksted led to the conclusion that an express diesel railcar will be cheaper to operate under Norwegian main line conditions than a diesel-electric locomotive hauling a train of ordinary carriages, or a normal steam train. The estimated costs, including interest and depreciation, for 100 seats per km. are 0.43 kr. for the railcar, 0.60 kr. for diesel-electric locomotive and train, and 0.64 kr. for a steam train. The normal type of train is thus estimated to be 40 per cent. per seat more costly to operate than a diesel railcar.

Diesel Railcars for Turkey

The Turkish State Railways recently made their bow in diesel traction by the acquisition of several standard-gauge four-wheeled cars powered by 120 b.h.p. M.A.N. engines and equipped with T.A.G. four-speed mechanical transmission, both carried below the car underframe. The seating capacity is 10 second class and 35 third class, there is lavatory accommodation, and light luggage can be carried on the roof. The tare weight is 16 tonnes and the top speed 47 m.p.h. Over headstocks the cars have a length of 41 ft. 7 in.



CITY OF DENVER TRAINS TAKE UP SERVICE

The fifth and sixth of the Union Pacific super-speed diesel trains operate on 65 m.p.h. timings

SINCE June 18 the Chicago-Denver route of the Union Pacific Railroad has been served by two 12-car streamlined diesel-electric trains which are known by the name of the *City of Denver*. Westbound the train covers the 1,048 miles in 16 hr., and eastbound in 15 hr. 50 min., giving respective averages of 65.7 and 66.2 m.p.h. inclusive of stops. Over the 218 miles from Julesburg, Colo., to Grand Island, Neb., the start-to-stop speed is 74.8 m.p.h., and there is a pass-to-pass schedule of 102 m.p.h. over a distance of 5.1 miles near North Platte, Neb.

Built by the Pullman-Standard Car Manufacturing Company to the requirements of Mr. A. H. Fetter, General Mechanical Engineer of the Union Pacific, these two 12-car trains are not of the articulated type except at the trailing end, where the four last cars are articulated in two groups of two cars. Originally, a more extended articulation was contemplated. The two power cars at the leading end are of Cor-Ten high-tensile alloy steel but the passenger vehicles are all of aluminium alloy. The complete train tares 569 Engl. tons, and weighs 596 Engl. tons in working order. With an aggregate engine output of 2,400 b.h.p. this gives ratios of 4.04 b.h.p. per ton of gross weight and 8.8 b.h.p. per passenger. The seating and sleeping accommodation is made up as indicated on the floor plan reproduced on the opposite page.

Although the two trains are alike, broadly speaking, there are one or two differences in detail, such as S.K.F. roller bearing axleboxes on the first train (No. M-10005) and Timken taper roller bearings on the second train

(No. 10006). New York air brake equipment is fitted to the first rake and Westinghouse apparatus to the second. Both trains differ from their immediate predecessor No. 10004, *City of San Francisco* (see issue of this Supplement for July 10), in having a somewhat larger cross-section for the passenger cars, the overall height being 12 ft. 8 in. (an increase of 15½ in.), and the overall width 10 ft. 0½ in. (an increase of 5 in.). The side panels are vertical instead of tapered in towards the top, and this, with the extra width, gives a considerable increase in the head room. The body framing is not of the almost unbroken tubular form of *City of San Francisco* (see page 89, July 10 issue), but the side panels are curved underneath at the bottom and brought up to the flanges of the main solebars. These solebars are deep and heavy channel sections and they are assisted by outside solebars of angle section.

As in the previous Union Pacific diesel trains, Winton two-stroke engines form the power unit. In the *City of Denver* trains each of the two power cars houses a 16-cylinder 1,200 b.h.p. engine complete with its own generator, electrical and auxiliary equipment, and furnishing current to nose-suspended motors on the four axles below. The wheels are 3 ft. in diameter. All the electrical equipment was furnished by the General Electric Company of America. Both power cars are fitted with a composite cab-signal and speed-control system for operation over the Chicago & North Western Railroad, whose tracks are used out of Chicago. On the U.P.R.R. lines this device functions as a two-indication cab-signal with a warning whistle.

A New British Diesel Locomotive—(Concluded from page 243)

diameter to thread over the cranks. The centre gear-wheel, taking the final drive from the reverse box, is brought into position in the same way. The reverse is of double-bevel and sliding dog type, and, together, with the gear wheels for the double reduction, was made by David Brown & Sons Ltd.

Exceedingly simple driving controls have been evolved. Apart from the brake handle and the reversing lever on each side of the cab, and the handwheel behind for starting the engine, there is only one main control, which regulates both the engine speed and the gearbox sequence. A handle on each side of the cab can be moved downwards, and in six definite positions it can be moved also to the left in slots provided in the guide plate. Checks are provided so that the lever cannot be moved straight down; it must enter and return from each horizontal slot. The first check is felt by the driver after the first speed has been selected and engaged and the ring valve of the fluid coupling opened; he then knows that the lever is opposite a horizontal slot, and pushing down this he accelerates the engine. At a suitable moment he brings the lever back and down to the next horizontal slot. This reduces the engine speed, shuts the ring valve, disengages the first speed and engages the second, and opens the ring valve again, when the engine is once

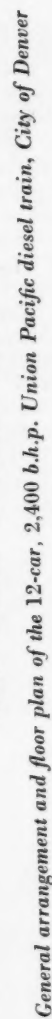
more ready for acceleration by moving the lever along the next slot. This operation is repeated for all the speeds. The lever can be restored to the neutral position instantly, as the checks upon the vertical movement operate in the down direction only.

Brevities

LIGHT RAILCAR BODY.—The Renault Company has built a railcar body of welded high-tensile steel which weighs only 3 tons despite a length of 82 ft. It is for incorporation in a double-bogie railcar of 300 b.h.p.

MORE MYLIUS DRIVES.—Fifty four-speed Mylius gear transmission sets have been ordered by the Reichsbahn for installation in railcars of 150 b.h.p. The total number of Mylius transmissions in railway service or on order is over 650. This type of transmission was described in the issue of the *Diesel Railway Traction Supplement* for January 25, 1935.

CABLE CORROSION BY FUEL.—Owing to the damage caused to the low voltage cables used for the lighting and auxiliary circuits in railcars by fuel and lubricating oil getting on to them, the French railways have set up a small committee to prepare a new specification for the insulating material. This commission is studying also the corrosion by oil of the higher tension cables used in vehicles with electric transmission.



NOTES AND NEWS

Büchi Supercharging.—The new German streamlined trains to be powered by M.A.N. engines, the order for which was noted on p. 92 of the July 10 issue of this Supplement, are to be turbo-charged on the Büchi system.

Swedish Railcar.—A 240-b.h.p. oil-electric railcar has been set to work on the Malmö-Ystad Railway. It seats 70 passengers and takes 43 tonnes. Normally it hauls one or two trailers.

Big American Diesel Locomotive.—The second of the three high-power diesel-electric locomotives ordered some time ago by the Illinois Central Railroad has been delivered. It is powered by a ten-cylinder two-stroke Busch-Sulzer engine, and weighs about 154 long tons.

Streamline Patent.—The streamlined form of the end of the Pullman-built diesel trains on the Union Pacific, as illustrated on page 88 of our July 10 issue, has been patented by the Pullman-Standard Car Manufacturing Company. One of the principal characteristics of the design is the grilled nose and raised cab placed well back, which protects the driver in case of collision.

Green Diamond Traffic Increase.—The Illinois Central streamlined diesel electric train Green Diamond, described in the issue of this Supplement for May 15, has been well patronised, and according to a questionnaire answered by the passengers, 22 per cent. of the travellers would have gone by other forms of transport if this particular train had not been available.

Diesel Locomotive for Ireland.—A 330 b.h.p. diesel-hydraulic locomotive is being built by Harland & Wolff Limited for shunting and branch line traffic on the 5 ft. 3 in. gauge system of the Northern Counties Committee of the L.M.S.R. It is to be powered by a Harland-B. & W. two-stroke engine, and will be of the six-wheeled type with a driving cab at one end and the torque transmitted from a jackshaft to the wheels through coupling rods.

More Diesels for South America.—Two diesel-electric locomotives, each of 900 b.h.p., are to be built by Harland & Wolff Limited, Belfast, for the 5 ft. 6 in. gauge lines of the Buenos Ayres Great Southern Railway, which, with the exception of one Beardmore engine, hitherto has employed only the Sulzer type of engine. The power units in the locomotives just ordered will be of the Harland-B. & W. two-stroke type.

Renault 1,000-b.h.p. Diesel Train.—The first of these three-car diesel mechanical trains built for the French State Railways is operating, in conjunction with a petrol-engined Bugatti, fast daily services between Paris and Havre at an average running speed of 72 m.p.h. The maximum permitted speed is 87 m.p.h. A description of this train appeared in our issue of November 29, 1935, and an illustration on p. 81 of the July 10, 1936, issue.

Czechoslovak Railcar Service.—The Blue Arrow diesel car service which has been running from Prague to Bratislava via Brno has been supplemented by a further diesel service operating on an accelerated schedule for the benefit of the long-distance passenger rather than for interurban traffic *en route*. The schedule for the 246.5 miles is 4 hr. 52 min. The new vehicles are of the double-engine type with a total output of 330 b.h.p. and a top speed of 75 m.p.h.

Siamese Diesel Stock.—During the last annual period for which figures are available, the 13 diesel-electric locomotives of the Siamese State Railways covered 801,490 km. (497,500 miles); the six diesel-electric railcars

104,202 km. (65,000 miles); and the two diesel-mechanical shunting locomotives 39,980 km. (24,750 miles). The aggregate fuel consumption was 1,069,575 kg., equivalent to 1.12 kg. per locomotive or railcar km. (4.0 lb. per mile) taken over all classes of service.

Japanese Diesel Trains.—The Japanese Government Railways are building a three-car welded steel streamlined diesel-electric train powered by two 240-b.h.p. Japanese-built engines. The train is to be tried on express service over the Tokaido route and on accelerated short distance runs. Designs are now in course of preparation for a larger streamlined train made up of five vehicles and driven by two 600-b.h.p. oil engines, located one at each end of the train.

French Local Railcars.—Two double-bogie metre-gauge diesel-mechanical railcars with 115 b.h.p. Berliet engines have been set to work on the lines of the Cie. Générale de Voies Ferrées d'Intérêt Local, in the department of Seine-et-Oise. The transmission is of the Minerva four-speed type giving road speeds of 9.7, 19.5, 28.7, and 41 m.p.h. These vehicles seat 70 passengers and have a tare weight of 15 tons. Two further cars of the same type are to be introduced on the Flanders system of the same company.

Fast Renault Service in France.—A 60 m.p.h. service with the 530 b.h.p. twin-articulated Renault diesel-mechanical trains is being operated by the P.L.M. Railway between Lyons and Paris. It leaves Lyons at 7.15 a.m. and returns from Paris at 6.45 p.m., thus providing a complement to the Bugatti train which leaves Paris at 8.0 and returns from Lyons in the evening. The time in each direction is 5 hr. for the 317.5 miles, including stops at Laroche and Dijon. These Renault trains, of which there are five on the P.L.M., are stationed at Lyons depot, and operate also trains on the Lyons-Grenoble and Lyons to Clermont-Ferrand routes.

Big Single-Unit Railcars in France.—A number of 600-b.h.p. Decauville railcars are now operating over the Alpine line of the P.L.M. Railway from Grenoble to Marseilles, and on certain trips between Grenoble and Briançon. The time between Marseilles and Grenoble has been reduced by these cars to 6 hr. 20 min. from the 7 hr. 48 min. of the principal steam train. These railcars are of the diesel-electric type with a Saurer 12-cylinder engine mounted on each bogie. This engine was described in the issue of the *Diesel Railway Traction Supplement* for November 29, 1935. When hauling a trailer, these cars ascend 1 in 40 grades at a maintained speed of 34 m.p.h.

Belgian Diesel Operation.—Apart from the eight high-speed diesel-electric trains delivered this summer, the Belgian National Railways operate 29 diesel railcars which cover an aggregate daily mileage approximating to 4,650, and a yearly mileage of 1,900,000; this is about 7 per cent. of the total passenger locomotive mileage of the Belgian National Railways. The cars are shedded at Liège, Haine St. Pierre, Meirelbeke, and Berchem. The operating costs, including maintenance and heavy overhauls, but without interest and depreciation, vary from 1 fr. 68 c. (Belgian) per km. for the 140 b.h.p. M.A.N.-engined diesel mechanical car set to work in 1934 to 2 fr. 22 c. for the three 175 b.h.p. Maybach diesel-mechanical cars introduced in 1930; these three last-named cars have covered an aggregate of approximately one and a quarter million miles.